NOLOGY DEPARTMENT

THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE—OCTOBER, 1947

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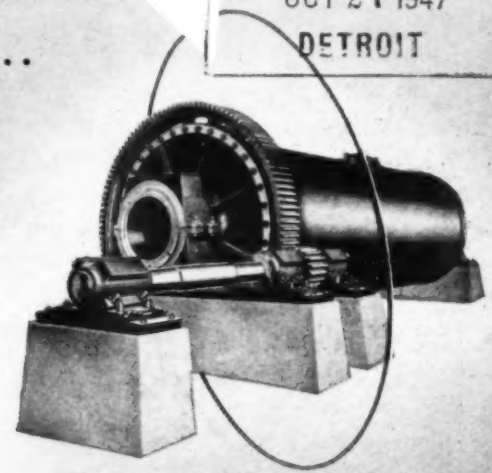
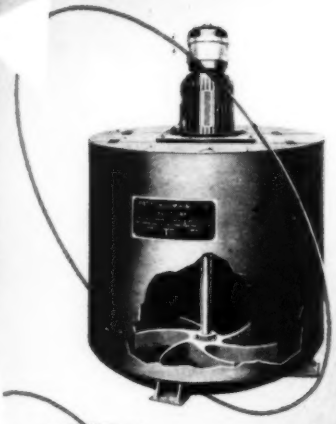
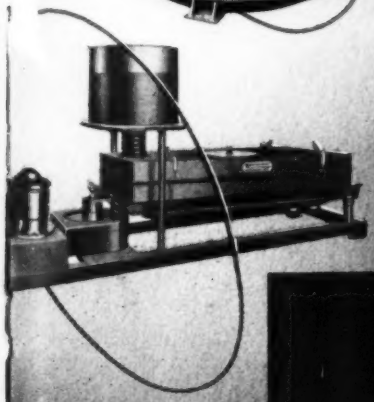
DETROIT

Serving Profits at Key Points
IN MODERN PAPER MANUFACTURE...







Patterson
SATISFACTORY **Machinery**

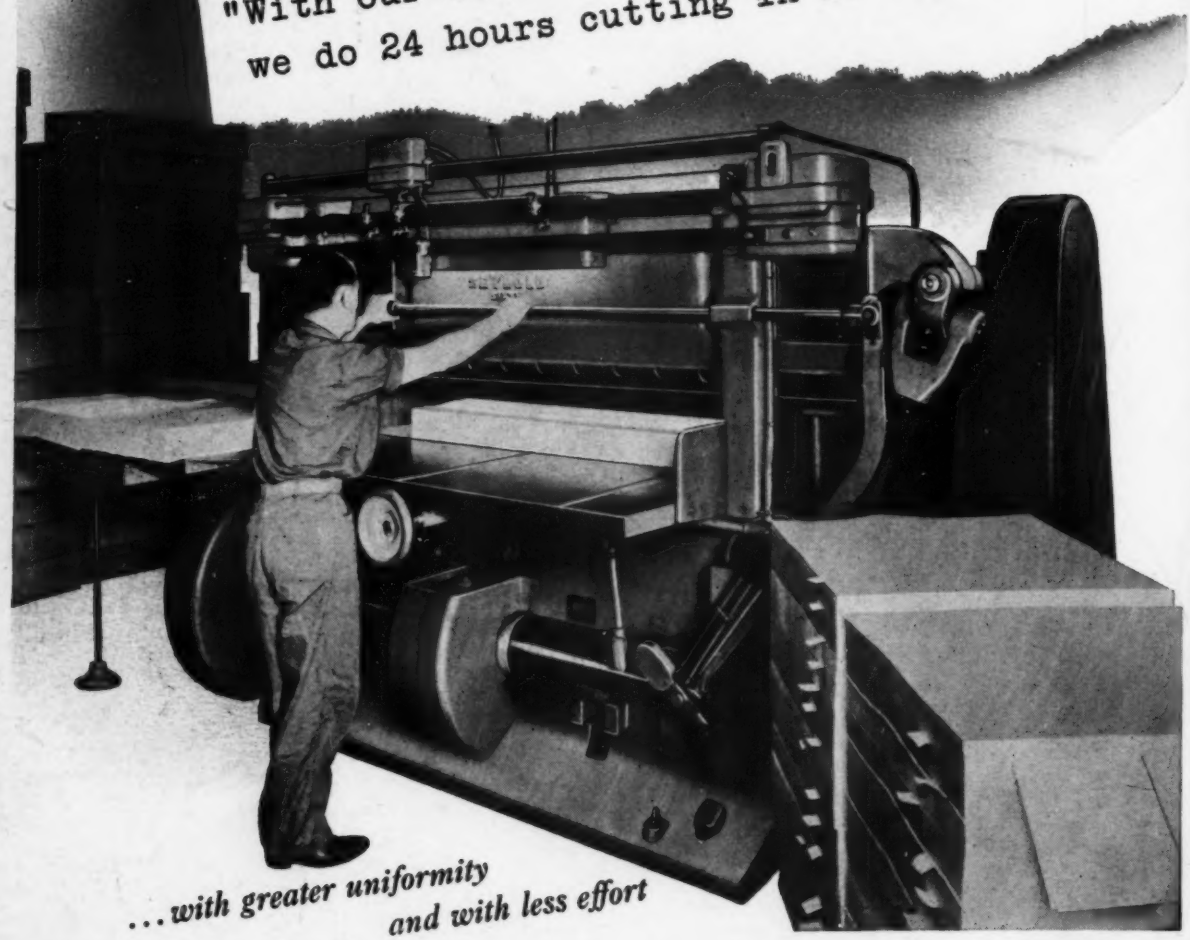
Patterson Equipment serves the paper manufacturer with maximum performance—longer useful life—minimum maintenance. In total, a fruitful investment!

The Patterson Foundry and Machine Co.
East Liverpool, Ohio
The Patterson Foundry and Machine Co. (Canada) Ltd.
St. Catharines, Ontario

R v.29² Oct. 1947-March 1948

PARSONS PAPER COMPANY REPORTS:

"With our new Seybold 'Sixty' Spacer Trimmer we do 24 hours cutting in 16 hours"



...with greater uniformity and with less effort

"Before installing our new Seybold 'Sixty' Mill Spacer, we were operating three trimmers, three 8-hour shifts. Now, with two trimmers, plus our new Spacer, we cut the same amount of paper in only *two* 8-hour shifts.

"Our operators were skeptical at first. They didn't believe that any paper-cutting machine could automatically make one cut after another, of various sizes, from a single predetermined setting—and do it accurately. With a little practice and experience, however, they were soon cutting more paper, with even greater uniformity than the human hand and eye could achieve—and were doing it with considerably less effort."

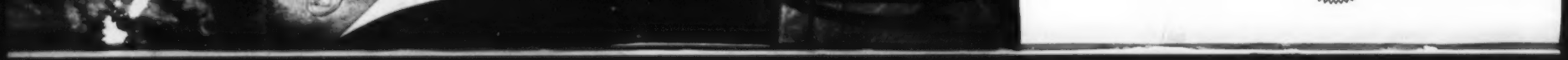
Greater efficiency is, of course, the key to more profitable operation. If you have the job of maintaining peak production at reduced cost, let a Harris-Seybold representative make an analysis of your cutting operations soon. His recommendation will probably show you how you can eliminate at least one of your problems.

Harris-Seybold Company • Cleveland 5, Ohio

YOU CAN CUT CUTTING COSTS W

SEYBOLD "Sixty" MILL SPACER TRIMMERS

Tech.



New design in the making

It is always a pleasure to work closely with our customers right in our own plant, where our staff and drawings and other requisites are immediately available. Photographed above, (left to right) are: Lloyd Hornbostel, vice-president in charge of engineering; C. R. Van de Carr, executive vice-president of Mead Corporation; and Elbert H. Neese, president of *Beloit Iron Works, Beloit, Wisconsin.*

BELOIT IRON WORKS · PAPER MACHINERY · BELOIT, WIS., U.S.A.

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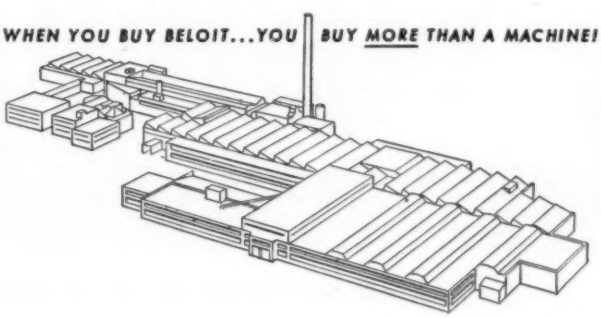
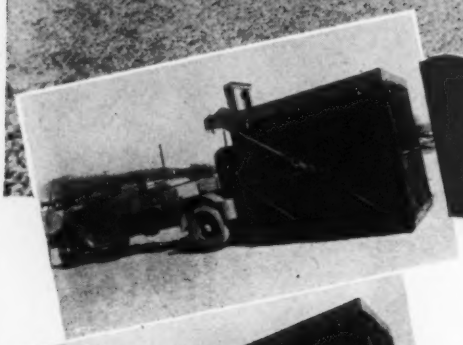
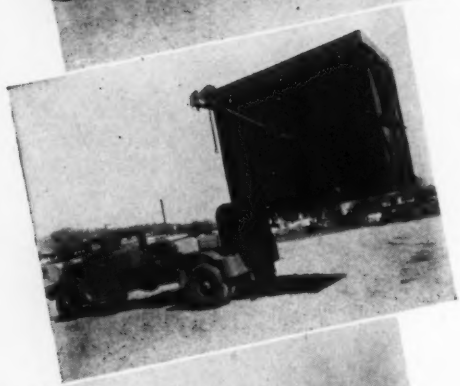


BELOIT

PAPER MACHINERY

..ANOTHER DEMPSTER DEVELOPMENT IN LOW COST MATERIALS HANDLING...





Dempster Engineers developed the Dempster-Dumpster Type "ARLF" to meet a manufacturer's problem in handling large quantities of bulky, cumbersome loads in an efficient and economical manner. Adaptability to the widest variety of materials and uses soon gained general acceptance for the "ARLF" and today it is providing efficient materials handling in some of the nation's leading industrial plants.

Looking at the installation illustrated on this page, it is easy to visualize the tremendous savings in payroll, maintenance and operational expense that result when one man and one truck handles 25 bodies, each having a capacity of 21 cubic yards.

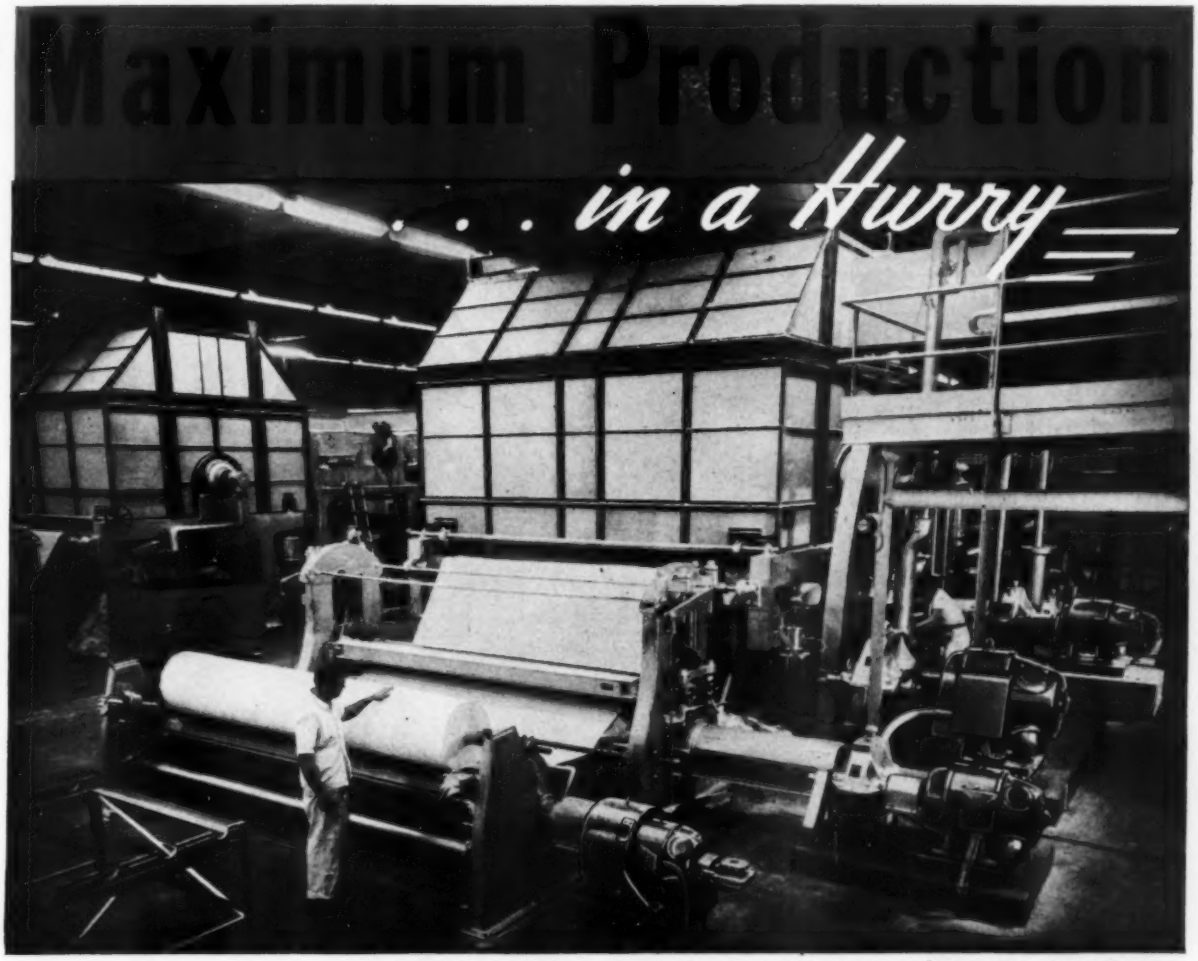
At left, the four pictures, from top to bottom, show how the truck hoisting unit handles a body. First: Truck Hoisting Unit prepares to pick up body. Second: Operated from controls in the truck cab, the hydraulic hoisting unit lifts the load vertically. Note how the automatic hydraulic stabilizing jacks provide perfect balance for the load. Third: Load moves forward to carrying position on the truck for hauling. Fourth: At destination, body is dumped by tilting, or load can be lowered to the ground without being dumped.

Dempster-Dumpster bodies of capacities from 1½ to 21 cubic yards are made in the form of tanks, racks and open or closed for use with every type of material whether it be gas, liquid or solid. So regardless of the type or size of material you handle, it will pay you to investigate the Dempster-Dumpster System. A letter from you will bring illustrated literature and full information on this remarkable system of materials handling.

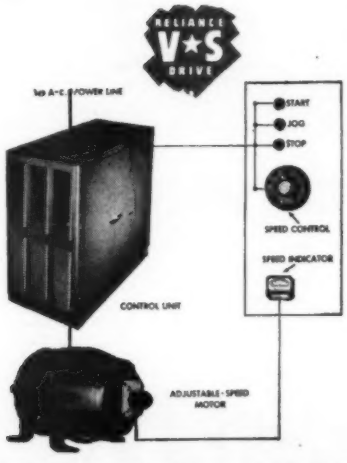
DEMPSTER DUMPSTER
TRADE MARK REG.

DEMPSTER BROTHERS, Inc.
9107 SPRINGDALE KNOXVILLE 17, TENNESSEE

Maximum Production . . . . in a Hurry



The V★S System maintains required tension for this Modern High Speed Tissue Machine.



Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 hp.

...with Reliance V★S Drive

V★S, the *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* accelerates a machine so smoothly, maximum production is achieved *faster.* V★S also provides quick, smooth starts and stops, an infinite range of stepless speed changes, continuous maintenance of proper tension—plus other advantages to meet specialized needs in material processing. And with V★S on the job, operation is greatly simplified—through all-electric control either at the machine or from remote stations. For more of this money-saving V★S story, let us send you Bulletin 311-A.

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"Motor-Drive is More Than Power"

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Diamond PRODUCTS MEET EVERY SPECIFICATION

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THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

VOLUME 29 - - - - - - OCTOBER, 1947 - - - - - - NUMBER 7

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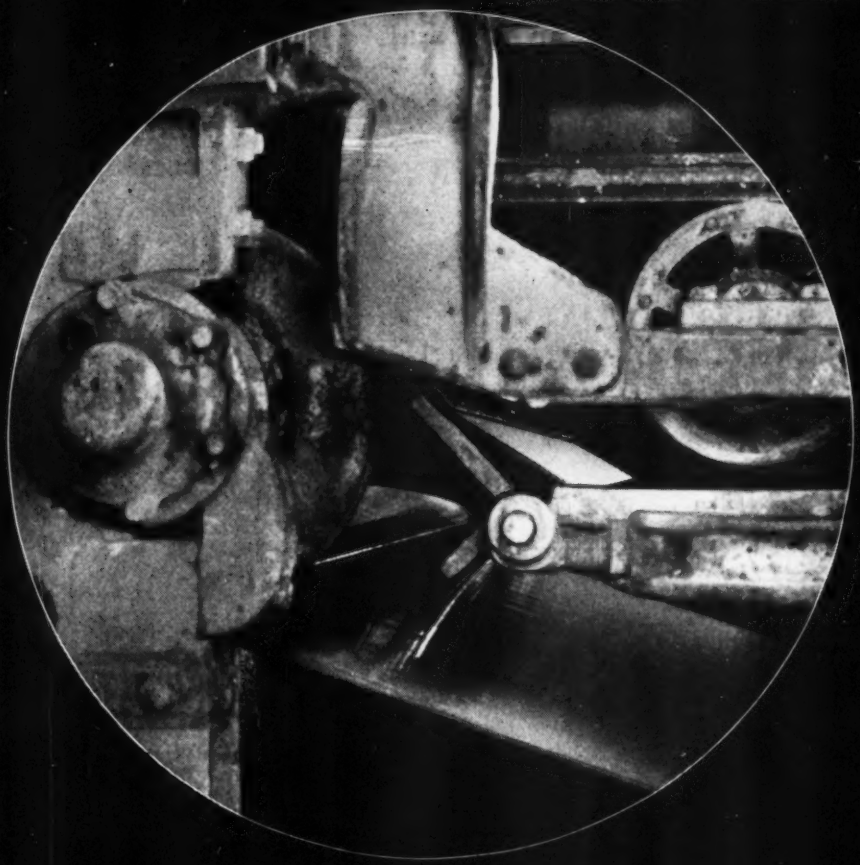

Lodding Doctors are increasing wire life in mills everywhere. Lodding Engineering Corporation. Worcester, Mass. Represented outside New England by W.E. Greene Corporation. Woolworth Building, New York.

IF YOU BUY OR SPECIFY CORROSION-RESISTING EQUIPMENT OR CASTINGS...

Engineers and other executives who have anything to do with the purchase or specifications of pumps, valves, pipe, heat exchangers, steam jets, and other corrosive-handling equipment will find this guide an invaluable aid.

Listing 155 corrosives in alphabetical order, it shows which of five well-known DURCO alloys offers most satisfactory resistance to each corrosive. Where two or more alloys are satisfactory for a particular service, selection can be made on the basis of the most economical alloy possessing the required mechanical properties, as shown in a table on page 2.

The alloys discussed are: *DURIRON* and *DURICHLOR*, high silicon irons; *DURIMET 20*, an austenitic stainless steel; *DURCO D-10*, nickel-base alloy; *Chlorimet 3*, nickel-molybdenum-chromium; and *Chlorimet 2*, a nickel-molybdenum alloy.

THE DURIRON CO., INC., DAYTON 1, OHIO
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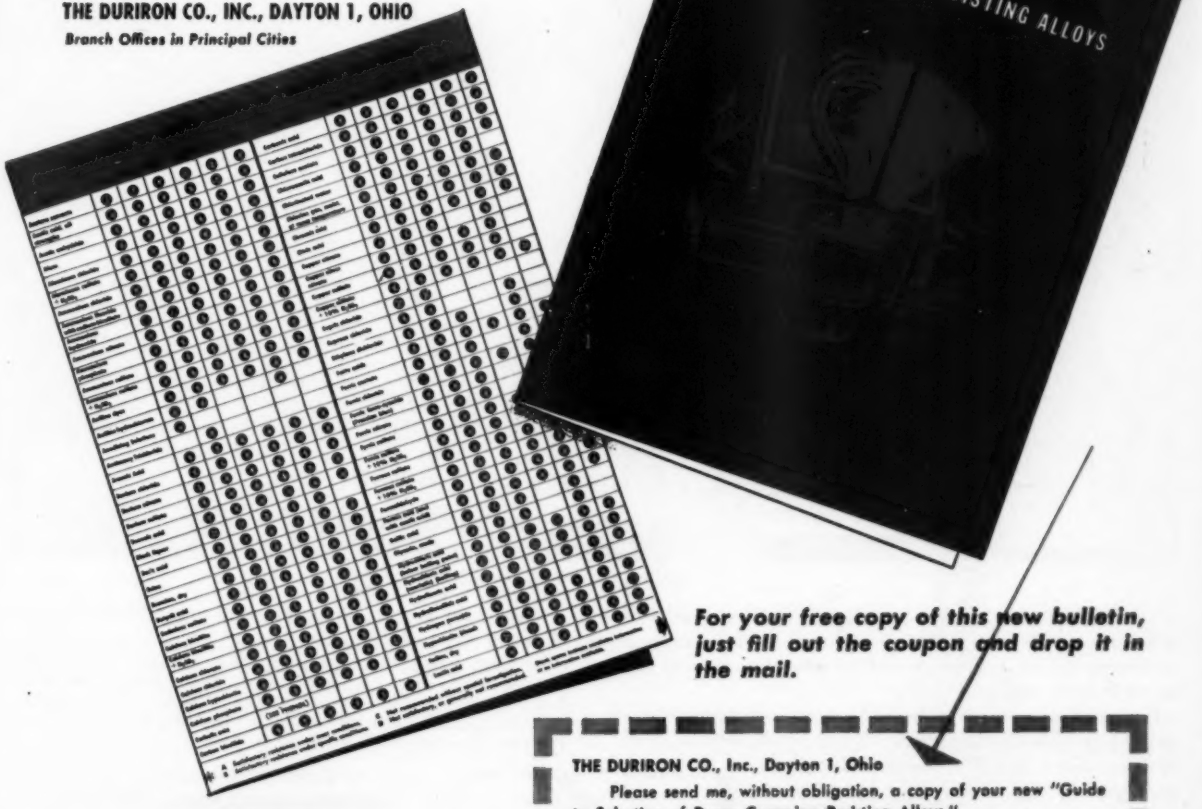

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THE DURIRON CO., Inc., Dayton 1, Ohio

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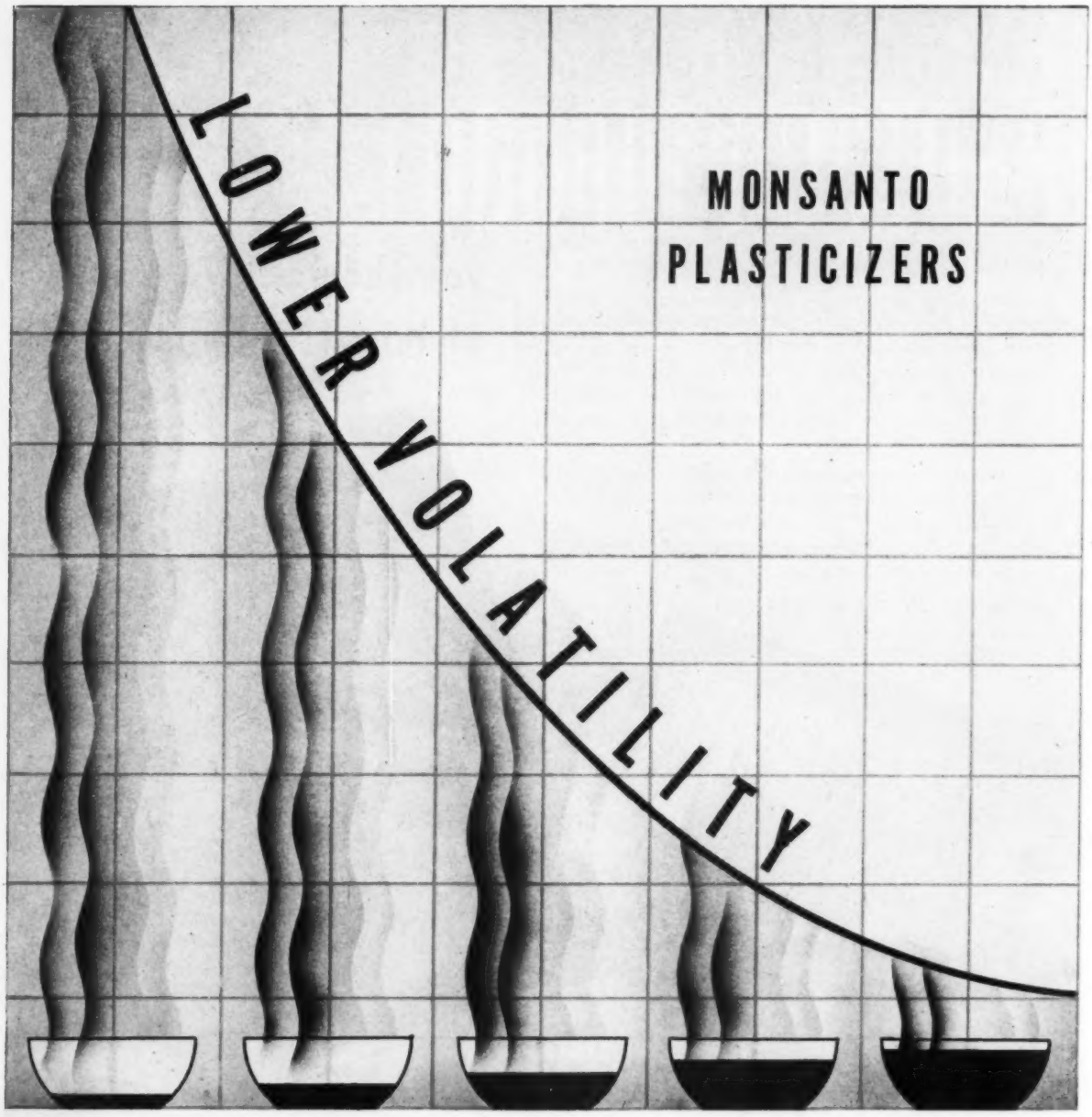

Lower ranges of volatility are being established by a series of new Monsanto plasticizers, now well advanced in the process of development. Their greater permanence will add increased usefulness to many applications.

In addition, extensive field tests and laboratory findings indicate that these new Monsanto plasticizers will also provide high standards of compatibility, flexibility, fire retardance, heat and light stability, elasticity, abrasion resistance.

For the present, most of these Monsanto plasticizers are not commercially available, since their production depends largely on chemicals now in short supply. However, Monsanto research and field tests are being continued with emphasis on those new plasticizers that can be produced from raw materials most likely to be available soonest, in greatest quantities.

If you have any present or prospective plasticizer problems, Monsanto may be able to help you with application suggestions.

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri . . . District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

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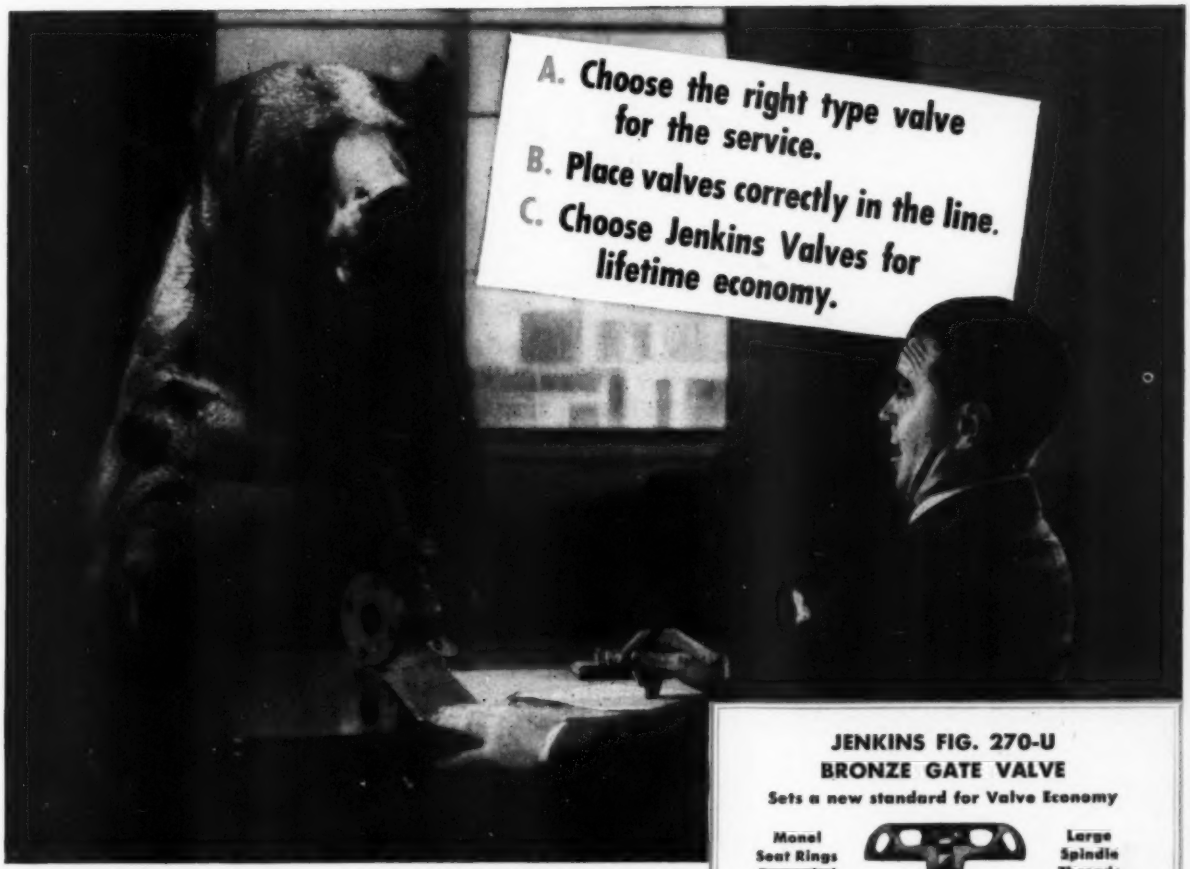
It's a Bear at cutting down Maintenance!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C. Choose Jenkins Valves for lifetime economy.

THIS SIMPLE ABC FORMULA, plus intelligent treatment and care of valves, is paying extra dividends in valve economy throughout industry.

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Exceptionally Rugged Body, Bonnet, and Bonnet Ring Add Strength

Deep Stuffing Box — More Packing
Keeps packing tight with less friction.

Bronze wedge seats against MONEL seat rings expanded into body. Easily replaced, slip-on wedge takes wear. Proved in toughest services, the best combination to beat wear, reduce care. Write for complete details.

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- ☆ TREMENDOUS WOOL CLIP
- ☆ IMPORTANT MARKETING CENTER OF POULTRY AND DAIRY PRODUCTS
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- ☆ EXCELLENT TRANSPORTATION
- ☆ OUTSTANDING SCENIC AND RECREATIONAL ATTRACTIONS
- ☆ HEALTHFUL LIVING CONDITIONS

✳ *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

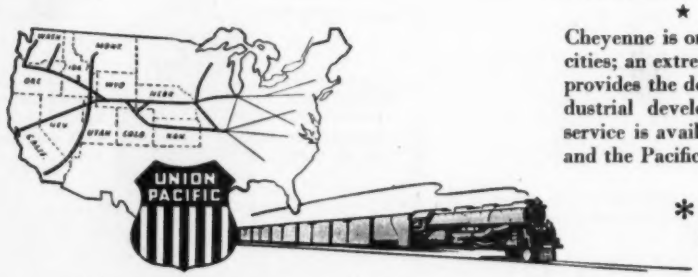
In Wyoming manufacturers will find a vast amount of raw materials. It is a leading state in potential mineral resources; produces great quantities of iron . . . has the world's largest untapped supply of coal. Copper, silver, gold, lignite and bentonite are among the mined metals and minerals. The State contains 27 oil fields and large timber lands.

Wyoming is one of the greatest of livestock States, producing fine beef cattle. Its wool clip is tremendous. Poultry raising and dairying are important activities. Principal crops are sugar beets, potatoes and grains.

The healthful climate . . . scenic and recreational attractions such as Yellowstone-Grand Teton National Park and scores of dude ranches . . . a fine educational system . . . are incentives to living in this western region.

★ ★ ★ ★

Cheyenne is one of the principal Union Pacific mainline cities; an extremely important point to the railroad which provides the dependable transportation so essential to industrial development. For travelers, daily Streamliner service is available from Cheyenne to and from Chicago and the Pacific Coast.



✳ *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

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TODAY

Sectional Drawing and Description of Sutherland Refiner Construction

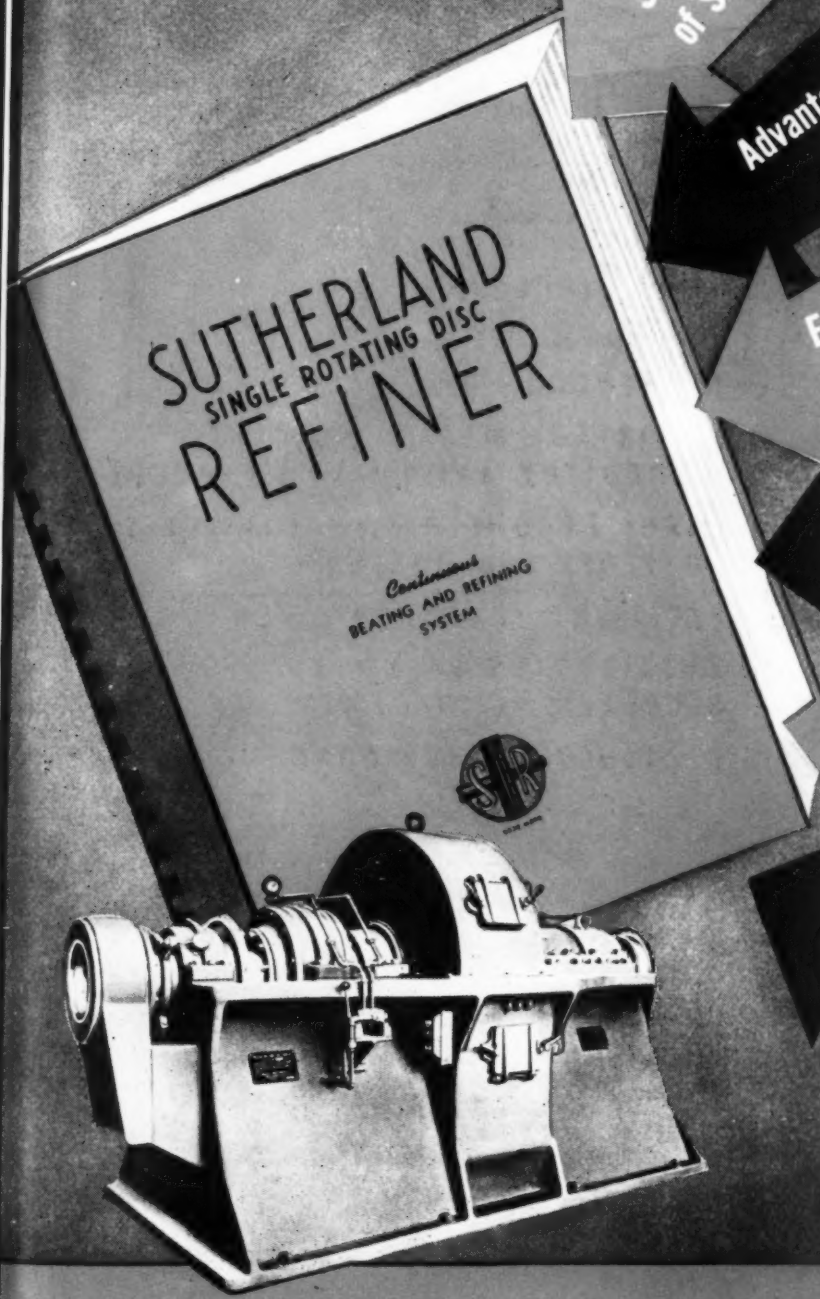
Advantages and Applications of Sutherland Continuous Beating and Refining

Engineering drawings of single and multiple refiner installations

Review of refining results in mills making various grades

Description of Principle and Method of Operation

Photos of all sizes of Sutherland Refiners, dimensions, weights



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Manufactured in the United States by Valley Iron Works Co., Appleton, Wisconsin

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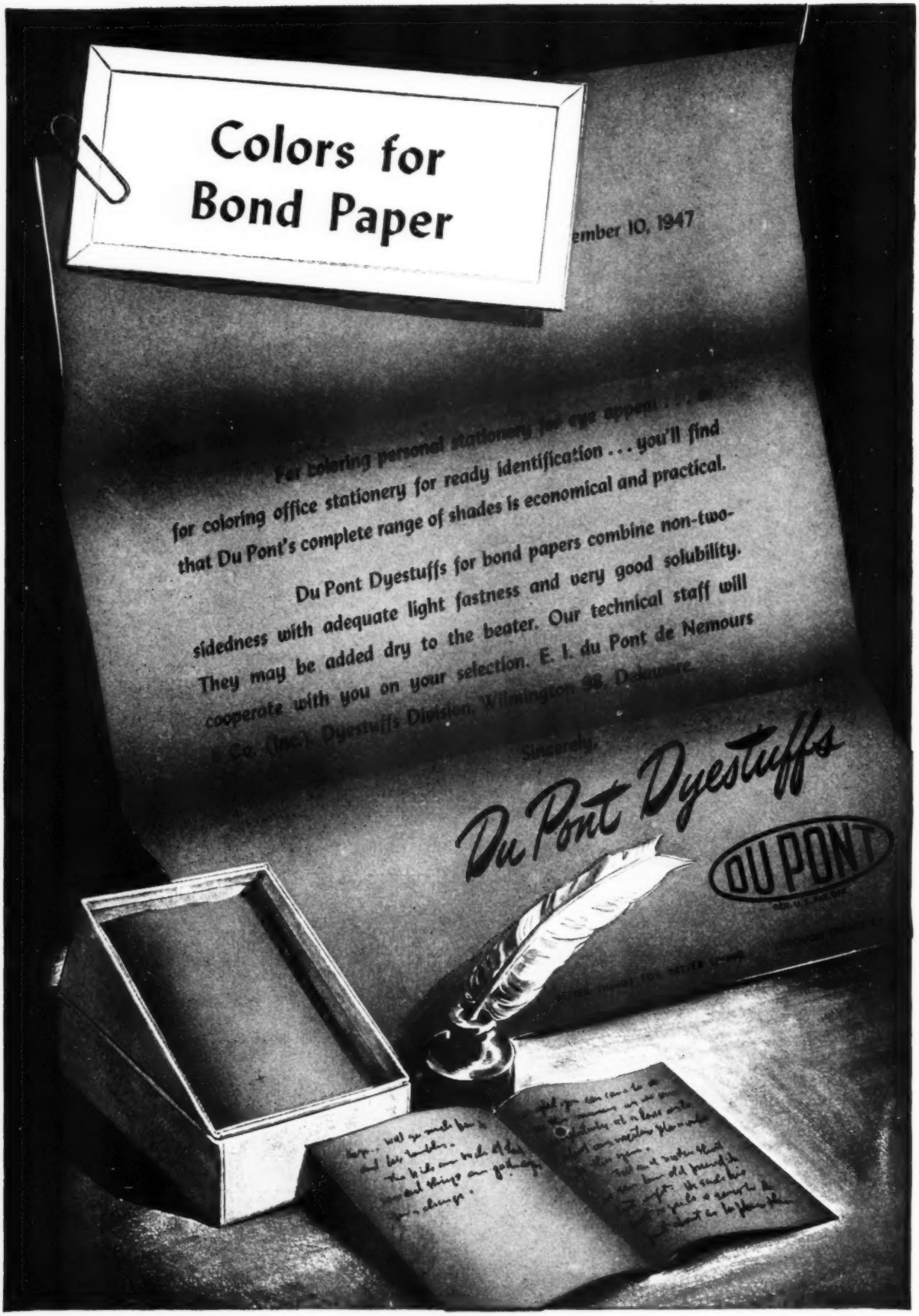
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for coloring office stationery for ready identification . . . you'll find
that Du Pont's complete range of shades is economical and practical.
Du Pont Dyestuffs for bond papers combine non-two-
sidedness with adequate light fastness and very good solubility.
They may be added dry to the beater. Our technical staff will
cooperate with you on your selection. E. I. du Pont de Nemours
Sincerely,
Du Pont Dyestuffs
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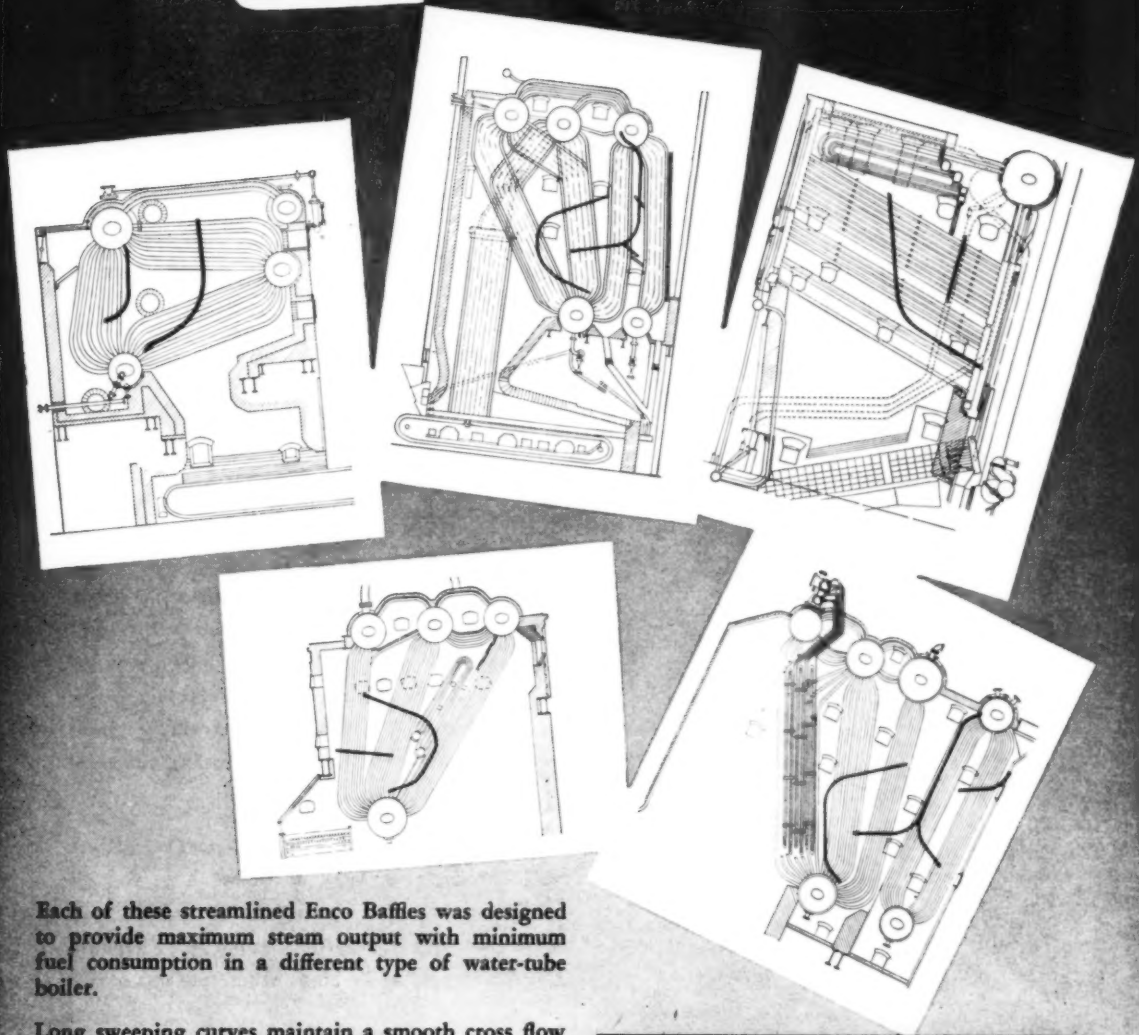
Streamlined for Savings
IN EVERY TYPE OF BOILER



Each of these streamlined Enco Baffles was designed to provide maximum steam output with minimum fuel consumption in a different type of water-tube boiler.

Long sweeping curves maintain a smooth cross flow of gases across every square foot of heating surface. Eddy currents, bottlenecks and dead gas pockets are eliminated—draft losses are cut to a minimum. Soot blowers work more effectively, less steam and less time are needed for cleaning.

Enco Streamline Baffles are individually designed and engineered to the exact requirements of your boiler. Experienced Enco-trained crews take charge of the installation.

The 18-page Enco Bulletin, BW44, shows how engineers throughout industry have gotten higher boiler efficiency and increased steam production through the use of Enco Streamline Baffles. Why not write for your FREE copy today?

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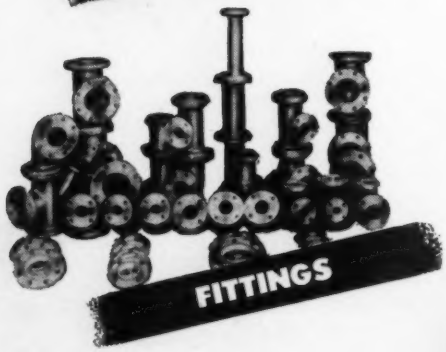
RESIST

CORROSION · ABRASION · HEAT

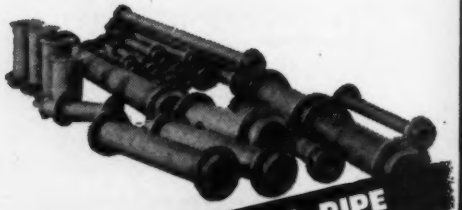
in the Paper Mill

with COOPER STAINLESS STEEL · · ·

CASTINGS



FITTINGS



CENTRIFUGAL PIPE

COOPER'S 25 Years of close association with the Paper Industry and its intimate knowledge of the problems peculiar to that industry . . . plus vast technical experience combined with practical shop skill has resulted in COOPER'S unusual ability to produce sound corrosion resisting Stainless Steel castings, fittings and centrifugal pipe specifically designed to resist corrosion, abrasion and heat in the Paper Mill.

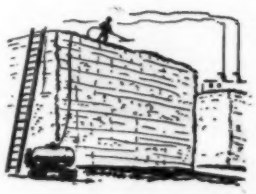
Each step in the production of COOPER Stainless Steel products is fully controlled . . . for all facilities and services at COOPER are located under one roof making The Cooper Alloy Foundry Co. the largest of its kind in the country.

THE COOPER ALLOY FOUNDRY CO.

HILLSIDE, NEW JERSEY

PROTECTION for exposed straw ricks

DOWICIDE G STOPS ROT LOSSES



Rot losses in baled straw stored in outdoor ricks can be prevented by treatment with Dowicide G. Three year tests conducted by one straw board mill have shown that losses, which may run to 15% of the straw during less than one year's exposure, are controlled by applying Dowicide G to the top tier of bales.

This important application is but one use of the Dowicides for preservation of agricultural residues. The straw board industry also uses Dowicides for the preservation of starch, for slime control, and in the manufacture of mold resistant board.

More information about this application of Dowicide G—and other uses of Dowicides—can be secured from the nearest Dow sales office.

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CHEMICAL COMMENTS

Dow Glycols Enter The Electrical Field

The five Dow Industrial Glycols, products of many-sided importance to a variety of industries, have extended their usefulness in the past few years into the electrical field. Modern small dry electrolytic radio condensers are made possible by virtue of the fact that glycols will dissolve appreciable quantities of boric acid. Diethylene Glycol is used successfully for this purpose, as it rates high as a nonvolatile conductor that does not corrode aluminum.

Germicide Keeps Hydraulic Emulsions Bacteria-Free

The action of bacteria in the hydraulic systems of metal fabricating plants causes frequent shutdowns and costly hydraulic fluid replacements. This trouble can be eliminated by the use of as little as one part Dowicide A per one thousand parts of the soluble oil-water hydraulic fluid. This application of the Dowicides has been used with excellent results with other systems employing soluble oils.

Methocel Keeps Pigments Stable in Paints

Methocel (Dow Methylcellulose) is proving useful in many ways in the paint industry and especially to manufacturers of water-base paints. It keeps pigments from flooding, settling or caking, provides thickening and binding action, and also serves as a pigment disperser. Its protective colloid action insures emulsion stability. In addition, its controlled viscosity prevents undue penetration and assures excellent brushing characteristics.

Further information on any of these chemical developments is available on request.

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..and a NEW Texrope Manual that Makes Selection Easy

THIS MANUAL marks a revolutionary advance in the application of V-belt drives. It enables every user to select, with unerring accuracy, the one *best* drive for any normal requirement. It eliminates guesswork, figuring and chance for error. It assures greatest possible economy and efficiency in the use of Texrope V-belt drive equipment.

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Every Pre-Engineered drive selection is made up of regular Texrope stock items. No special-order equipment is required. You can't make the mistake of buying a larger, more expensive drive than you really need, or of installing an underpowered drive that will be costly in performance and maintenance. Texrope Pre-Engineered drive selections are the *best* engineered drives — in low first cost — in performance — in reduced maintenance.

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Copies of this new manual have been sent to many Texrope users and dealers. If you have not received one, write for Texbook No. 20P40. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2249

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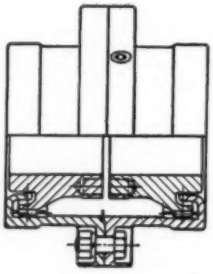
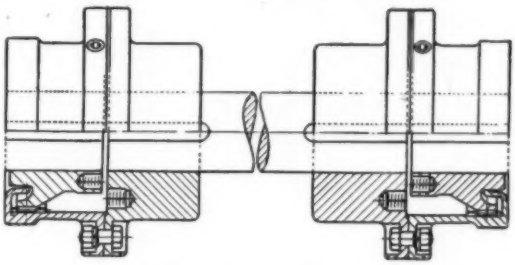
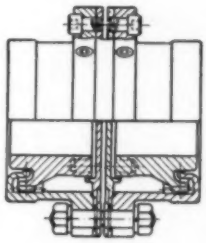


STANDARD



FLOATING SHAFT



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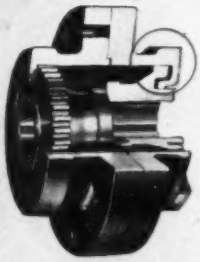

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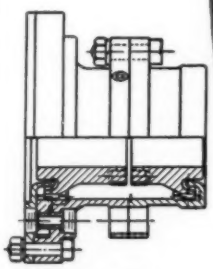
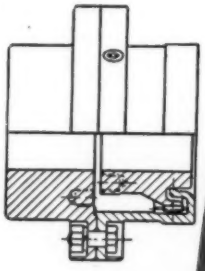
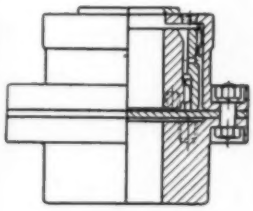


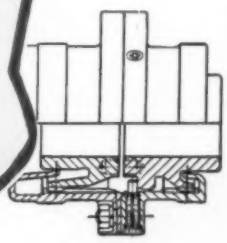
SHEAR PIN



SINGLE ENGAGEMENT



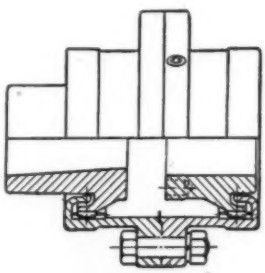
VERTICAL



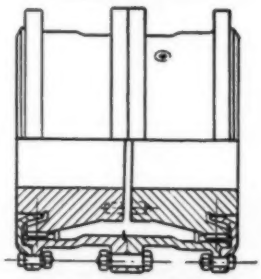
CUT-OUT

K KOPPERS

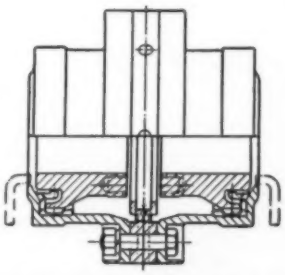
FAST'S *self-aligning* COUPLINGS



MILL MOTOR



HEAVY DUTY



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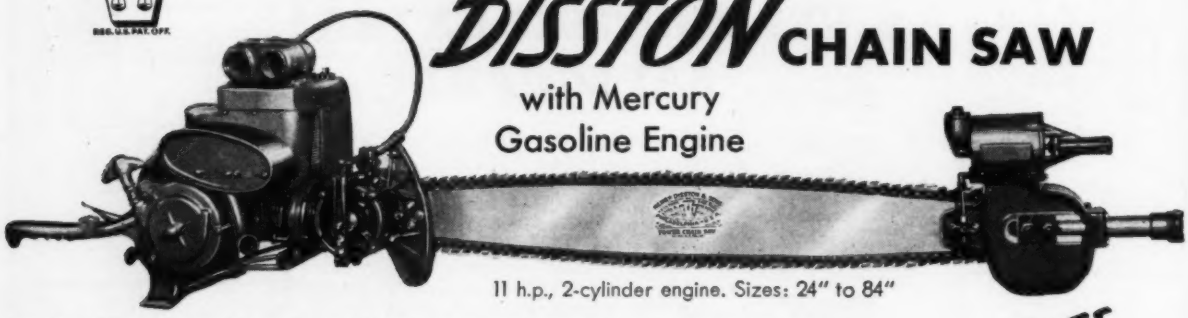
All kinds of timber cutting

...now at *new* LOW PRICES

DISSTON CHAIN SAW with Mercury Gasoline Engine



11 h.p., 2-cylinder engine. Sizes: 24" to 84"

For fast, dependable performance—in timber cutting of every kind—the Disston Chain Saw is outstanding. It's a portable, easy-to-operate, two-man, self-contained unit for use in forests and parks; on tree service, railroad and contracting work; at shipyards and manufacturing plants—wherever there are trees to fell and buck or timbers to cut.

The Disston Chain Saw is built for long, hard service and low cost operation. It delivers more horsepower per pound of weight, and is manually controlled to utilize full engine power under all cutting conditions.

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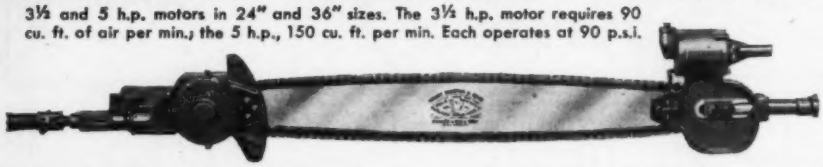

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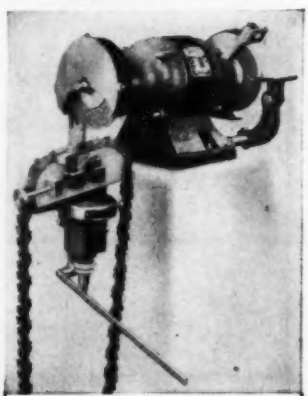

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Enables you to do your own sharpening . . . quickly, easily, accurately. Keeps chains in first class condition.

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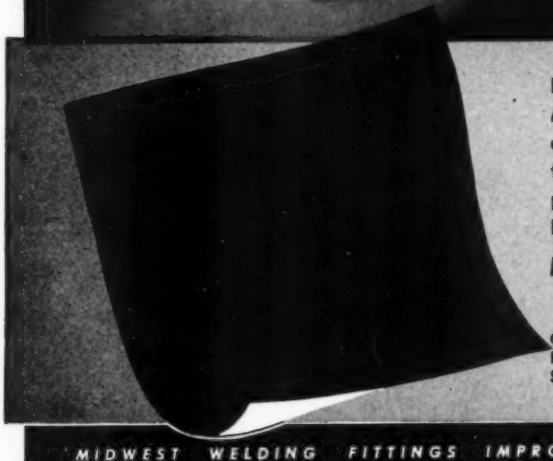
STAINLESS STEEL WELDING FITTINGS

BY MIDWEST



Illustrated here are the various standard Stainless Steel Midwest Welding Fittings. Types 316 and 347 are carried in stock; type 304 and other analyses can be furnished on order. Fittings are hot formed, annealed and pickled; they conform with ASA Specifications for Steel Butt-Welding Fittings.

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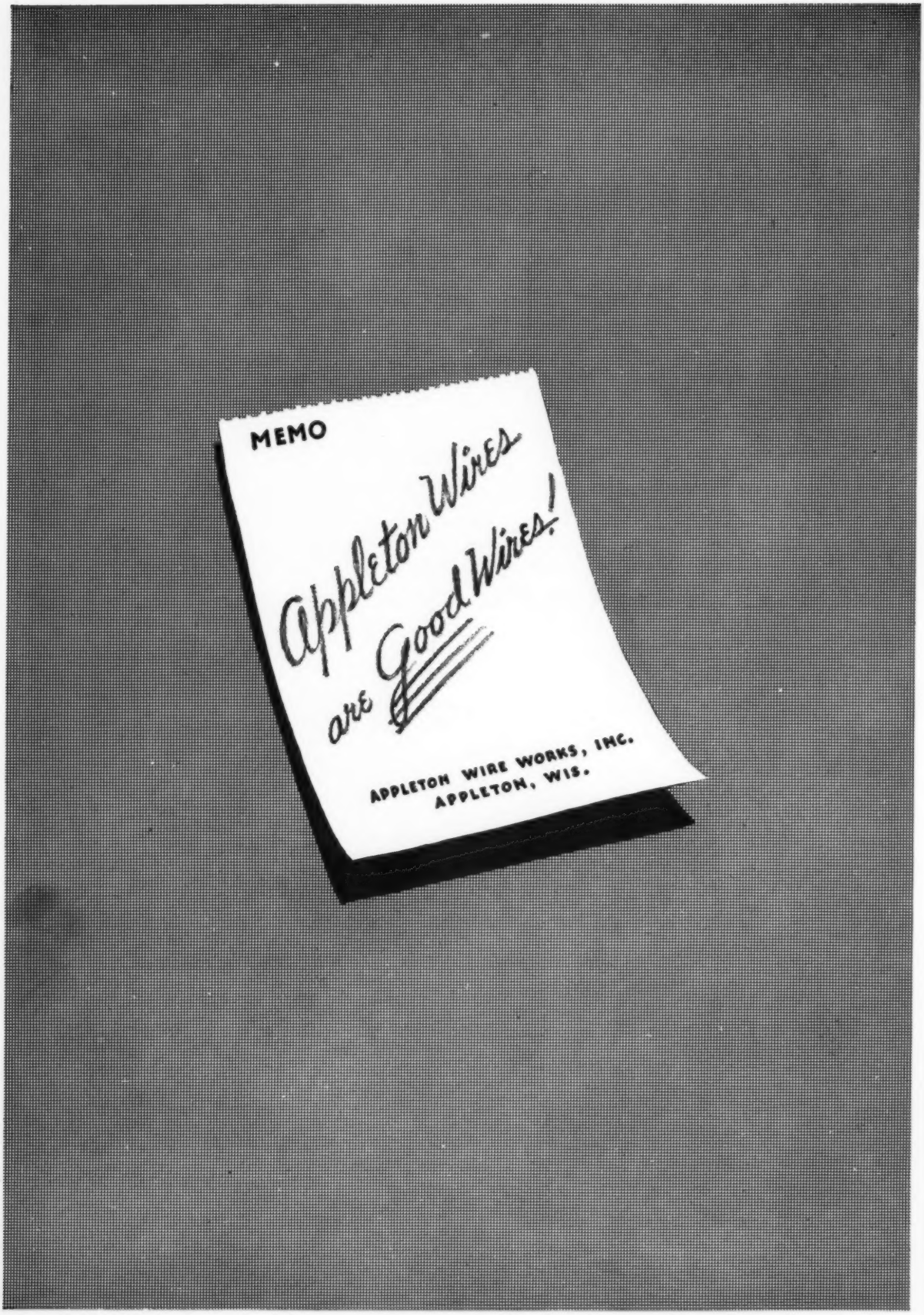
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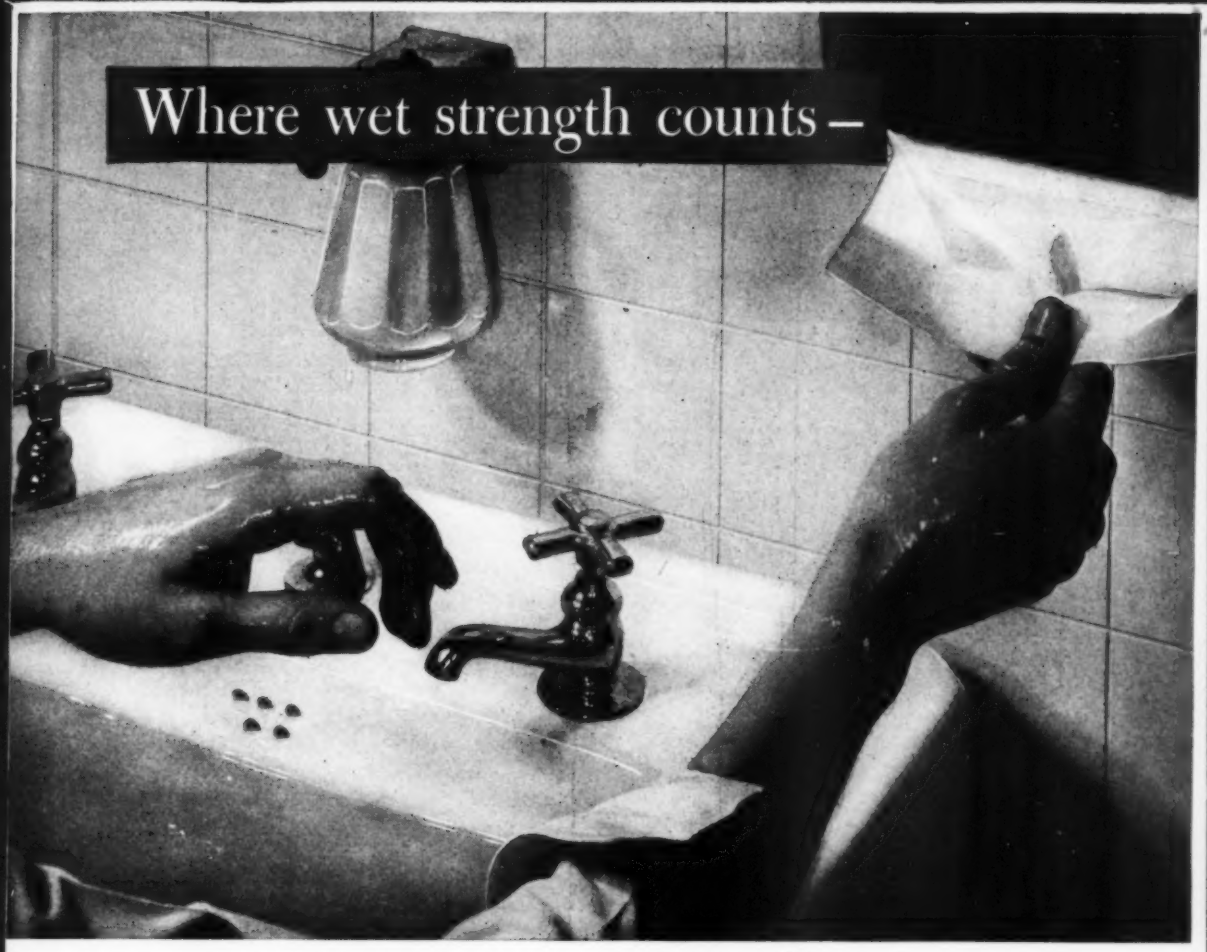

–count on UFORMITES 467 and 470 for an effective, economical job

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UFORMITE 467 is particularly designed for use with Kraft by beater addition. UFORMITE 470 is recommended especially for sulfite stocks, can also be used advantageously with Kraft, rag and groundwood stocks, in the manufacture of high wet strength glassine, wrapping paper, chart and ledger paper or light weight absorbent tissues.

You can easily add these urea formaldehyde resins to your present manufacturing process . . . with no major change in your operating procedure. And—with no pretreatment, no special handling, no extra steps—as little as 1% resin solids on dry fibre weight will increase your paper wet strength as much as 300%!

And UFORMITES 467 and 470 do more than give you higher wet strength—they improve dry tensile and Mullen, fold, uniformity of sizing, and coating surface characteristics. Why not look into the many benefits resulting from these resins? We will be glad to send full details on request.

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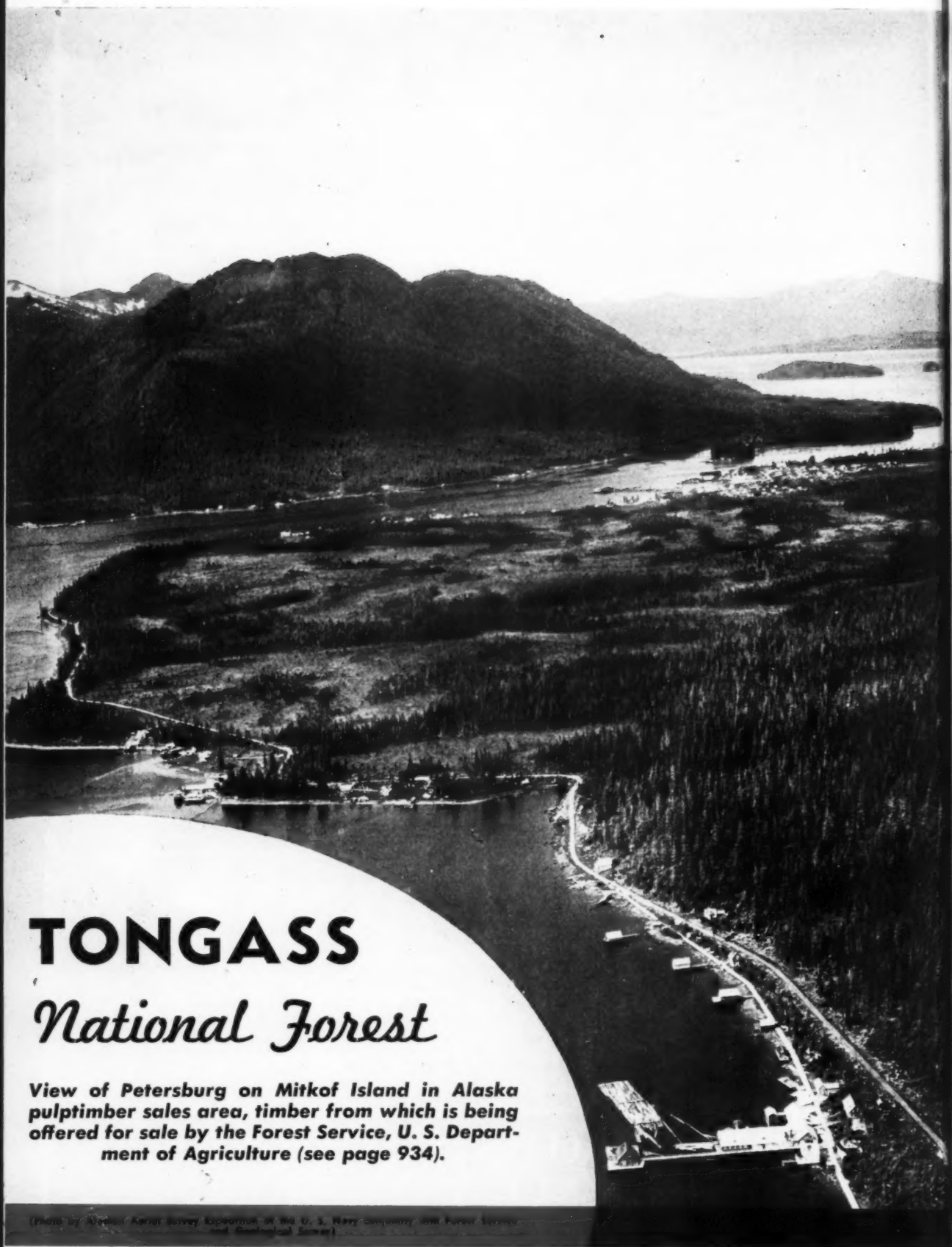


TONGASS

National Forest

View of Petersburg on Mitkof Island in Alaska pulptimber sales area, timber from which is being offered for sale by the Forest Service, U. S. Department of Agriculture (see page 934).

(Photo by Alaskan Aerial Survey Expedition of the U. S. Navy cooperating with Forest Service and Geological Survey)

TRADE WINDS

West Virginia Pulp and Paper Co. Holds Open House at Covington

▶▶▶ MORE THAN 5,500 Virginians have a clearer conception of the papermaking industry following a two-day community open house held recently by the Covington (Va.) plant of West Virginia Pulp and Paper Company.

Planned by the employees and management of the plant, the open house was staged to give the families of employees and the community at large an opportunity to see the large plant in operation.

The first day of the open house was set aside for families of employees and attracted a total of 2,500 visitors during a six-hour period. The community at large was invited the second day and 3,000 visitors responded. The guest registration book revealed that visitors came to the plant from throughout the state of Virginia and from more than half of the 48 states.

All visitors toured the plant between the hours of 9 a.m. and 3 p.m., and the entire pulp and papermaking process was unfolded before them while the day shift was on the job.

Every stage of the operation was explained to the visitors by large signs posted along the well-marked route and by employee guides who were thoroughly acquainted with the plant operation.

The first stage of the tour was made on foot. It began at the chip house and included all operations to the shipping room, where freight cars were being loaded with finished products.

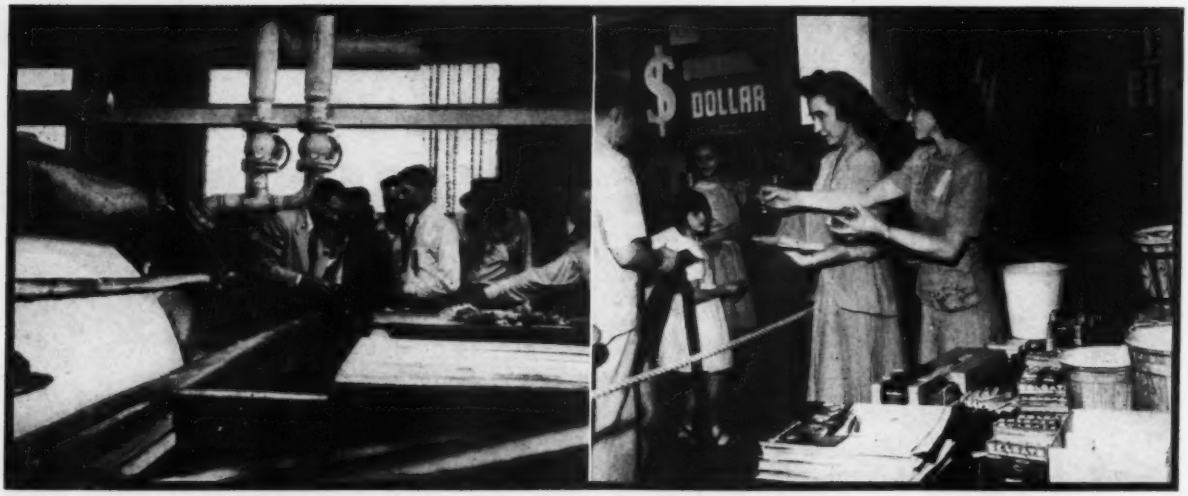
A favorite sight of the visitors were the huge paper machines which turn out more than 200,000 tons of paper and paperboard annually at the Covington plant. An interesting contrast which caught the fancy of the visitors was a replica of Chinese papermaking equipment constructed by employees which demonstrated papermaking methods of the second century. The Chinese equipment was located alongside the No. 5 paper machine, largest in the Covington plant. Samples of hand-made paper processed on this equipment were given the visitors.

After viewing the pulp and papermaking processes, the guests were loaded into buses and taken on a tour of outlying sections of the plant area. Six 50-passenger buses were employed on this section of the tour and in each bus was a specially trained guide who explained the operations. Major stops on this phase of the tour included the Covington plant's new $1,000,000 wood handling equipment and the No. 1 board mill.

The last phase of the tour came at the Westvaco Clubhouse, where the company had prepared graphic displays to explain in detail the scope of the pulp and paper industry and the company's operations. The displays included an exhibit of hundreds of products made from Covington paper, paperboard and chemicals; an exhibit of safety equipment provided by the company to protect its workmen; an exhibit demonstrating distribution of the company sales dollar, and a unique flow chart showing the operations of the Covington mill and featuring samples of wood products during each stage of manufacture.

Each visitor received a souvenir booklet entitled "Covington Makes

One group of visitors (almost 6,000 in all) who viewed the new wood handling equipment during two-day community open house at the Covington plant of West Virginia Pulp and Paper Co.



LEFT—Various stages of pulp bleaching attracted the interest of visitors during the community open house. Here a group sees, feels, smells and tastes samples of pulp being washed in the Covington plant. . . . RIGHT—Free samples of products utilizing goods manufactured by the West Virginia Pulp and Paper Co. were given the visitors during open house. Candy and gum delighted the children. Grownups were given a variety of gift packages—soap, powder, stationery, note pads, etc.

Paper," which included many interesting historical and economic facts about the Covington plant. The booklet included several pictures of the plant and saluted 26 veteran employees who have served in the plant for more than 40 years.

The visitors received hundreds of small gifts, samples of products utilizing goods manufactured by West Virginia Pulp and Paper Company. Candy and gum were the favorites of the children, while the adults were given soap, tooth paste and powder, stationery, and note pads.

That the open house was an unqualified success is attested by scores of congratulatory letters received by the management from visitors who toured the plant and from hundreds of verbal congratulations made during and after the event.

West Virginia Pulp and Paper Company is one of the largest paper manufacturing firms in the United States. It began in 1888 as Piedmont Pulp and Paper Company with a small sulphite pulp mill located in Maryland, with the post office address of Piedmont, West Virginia. The plant employed 60 persons and produced about 9,000 tons of pulp a year.

Construction of the Covington plant, one of six now operated by the company, was begun in 1899. It consisted of a pulp mill and a paper mill with two machines. About 300 men were on the payroll, which ran to about $115,000 annually. The rated production was about 15,000 tons of pulp and 7,500 tons of paper annually.

Today, the huge plant that sprawls along the banks of the Jackson River here includes two large pulp mills capable of producing more than 200,000 tons of pulp a year. There are seven paper machines, one paperboard machine and two specially board machines with a total rated capacity of more than 200,000 tons annually.

◆

BRITISH PAPER NOTES

(August, 1947)

▶▶▶ The British paper trade, like every other industry, is waiting upon the trend of events to see how the government intends to meet the present national crisis.

By the time these notes are published arrangements will have been made for the 26th License Period which covers the four winter months, November to February. The trade will then have clearer view of the immediate production possibilities by way of allocation of materials, coal, etc. The only item of news is the possibility that a part of the paper and pulp arranged to be delivered by Sweden to Great Britain this year may be diverted to other countries.

Meanwhile with the holiday season operating and Parliament dispersed, trade generally is uneventful but the progress made this year so far is revealed by the board of trade returns covering the period January-July. The total of materials received are well in excess of last year. The present figure, 620,663 tons, is approximately 110,000 tons in advance of 1946 but this is almost entirely due to increased receipts of esparto grass. Whereas imports of this grass between January and July of last year were 43,930 tons, imports for the same period of this year were 179,692 tons. Among the wood pulp receipts, chemical, dry bleached has declined from 80,470 tons to 69,776 tons, the chemical, dry unbleached from 201,336 to 191,637 tons and the mechanical wood, wet, from 130,457 to 114,136 tons. There has been a little extra tonnage received of chemical, wet and mechanical, dry. Imports of rags at 10,206 tons are in excess of the prewar rate.

It is also disclosed that the imports of paper and boards for the first seven months of this year are nearly 100 per cent higher than for the same period of last year, the present total being 302,041 tons. Imports of writings and newsprint are up on last year, but over half of this extra tonnage is accounted for by strawpaper and strawboards. Exports by Finland to Great Britain of paper and boards are 100 per cent higher than last year as are those from Norway. Sweden is about 30 per cent up and the total from the Netherlands has jumped from 571 to 62,081 tons. Canadian and Newfoundland receipts are also better than in 1946, while the total received from the U.S.A. has advanced from 3,918 to 6,067 tons.

The export side unfortunately discloses only a slight improvement, from 59,658 to 65,845 tons. In this connection it is particularly noteworthy that exports to Egypt have declined by 75 per cent.

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▶▶▶ ADDITIONAL LAND adjoining its present plant has been acquired by Loroco Industries, Inc, of Reading, Ohio. New buildings and railroad facilities will be erected on the 50-acre site. A residence now located on the property will be remodeled to serve as a lodge to house visiting customers. Modernization of the present paperboard plant is also planned.

PAPER · · · America's 6th Industry

PAPER CORDS FOR MONDAY'S WASH

(NEWS ITEM: *Special-treated paper cords are being manufactured into clotheslines.*)

Here is longer life for family clotheslines—special-treated paper cords that actually last ten times as long as ordinary lines. Made of kraftcord with a steel center, this new type clothesline is coated with a plastic resin and will not stretch or sag. Paper clotheslines remain unaffected by weather conditions; will not rot. Can be wiped clean with a damp cloth.

Further information on this new paper product may be obtained from manufacturer's leaflet which we will furnish on request.

Paper paint cans . . . paper draperies . . . dusting paper . . . paper wash cloths . . . New uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, including one for Kraft paper for multi-wall bags; also one Cylinder Machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF SUPERIOR QUALITY

EXTEND DATE FOR FIRST BID ON ALASKA PULPTIMBER-TIME SET FOR BID ON SECOND AREA

The Forest Service of the U. S. Department of Agriculture announced on September 22 that time to qualify for bidding and the auction date for the sale of 1,500,000,000 cubic feet of national forest timber in the vicinity of Petersburg, Alaska, have been extended. The date first set for awarding the bid was October 1.

Under the revised schedule, parties who desire to qualify for bidding may submit statements to Lyle F. Watts, Chief of the Forest Service, on or before January 5, 1948. Applicants will be advised as to whether they qualify on or before February 2, 1948. The oral auction will be held in the Chief Forester's office, Room 3008, South Agricultural Building, Washington, D. C., beginning at 2:00 P.M., February 18, 1948. All other terms and conditions of the proposed sale, which was originally announced on August 13, remain unchanged.

The postponement will not effect any material delay in the actual development of this important Alaskan project, according to the Forest Service, because surveys and work on the ground are difficult during the winter months. [*See page 930 for view of Petersburg on Mitkof Island in Alaska pulptimber sales area.*]

Bids Are Asked for Second Offering of Alaska Pulptimber

Bids for the second large tract of Alaska Pulptimber were asked in an announcement by the Forest Service on September 16. This invitation for bids for the sale of 1,500,000,000 cubic feet of national forest timber in Alaska is in an area described by the Forest Service as within Pulptimber Allotments E, F, and G, in the general vicinity of Ketchikan. Of the timber in the sale area, enough to run a pulp mill with a capacity of 525 tons per day for 50 years, about 75 per cent is estimated to be western hemlock and the remainder Sitka spruce and small amounts of Alaska and western red cedar.

Under the present schedule, bidders for this second tract must file with Lyle F. Watts, Chief of the Forest Service, Washington, D. C., on or before November 17, 1947, statements as to financial responsibility, experience in the making and distribution of pulp and paper products, or in construction and operation of large industrial projects, and as to knowledge of the timber, waterpower and other operating conditions in the Territory, particularly in the area concerned. Parties who qualify themselves as bidders will be so informed on or before December 1, 1947, at the office of Mr. Watts, in Washington, and oral auction bids will be received from the qualified parties on December 15, 1947, at the office of Mr. Watts, in Washington. Preliminary award to the highest qualified bidder will be made on that date. Copies of the prospectus may be obtained from the Washington office of the Forest Service or from the office of Regional Forester Frank Hointzleman, Federal and Territorial Building, Juneau, Alaska.

Shown on a recent visit to inspect pulptimber in the Petersburg and Thomas Bay area of the Tongass National Forest (Alaska) are: (L to R) Lyle F. Watts, Chief of the Forest Service, U. S. Department of Agriculture; C. M. Granger, assistant chief; and Charles C. Durbick, veteran Alaska U. S. Forester

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IMPORT NOTES

The first shipment of printing paper ever reported from Russia arrived in this country in July, according to Warren B. Bullock, manager of the Import Committee of the American Paper Industry. The shipment consisted of 40 tons, valued at approximately $11,000. Small shipments of newsprint from various European countries continue to reach the American market, one such being 100 tons from Austria; valued at $190 per ton, and French paper is arriving regularly, July imports being 1,750 tons valued at $175 to $180 per ton.

Considerable tissue paper has been imported from Sweden, and classified for duty at 2½ cents per pound and 7½ per cent, the rate for such paper valued at less than 15 cents per pound. The paper weighs 7.6 pounds per ream of 288,000 square inches. A shipment of fruit wraps for apples and pears has been received from Canada at a port in the State of Washington. The wraps are unprinted, some with oil treatment, and are in three sizes, 9x9, 10x10 and 11x11 inches. They will be assessed for duty at the rate for tissue paper under 15 cents per pound in value, 2½ cents per pound and 7½ per cent.

◆

FINANCIAL

▶▶▶ ALTHOUGH THE NATION'S securities markets showed a lack of investor interest during the past month, presumably because of the uncertain world situation, paper mill securities showed no definite trend in either direction. Changes up or down seemed to be based on the trend of earnings, those companies whose reports showed prospect of continued high dividends being most in favor.

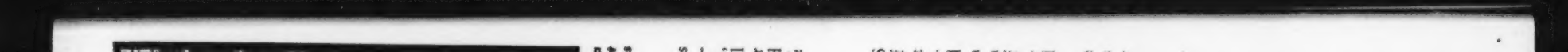
Celotex Corporation—Net income for nine months ended July 31 was $4,507,963 as against $2,436,330 for the same period the previous fiscal year.

Crown Zellerbach Corporation—Net profit for three months ended July 31 was $4,824,205 as against $2,704,605 the previous year.

Gaylord Container Corporation—Net earnings for six months ended June 30 were $4,751,017 as against $1,798,737 for the same period in 1946.

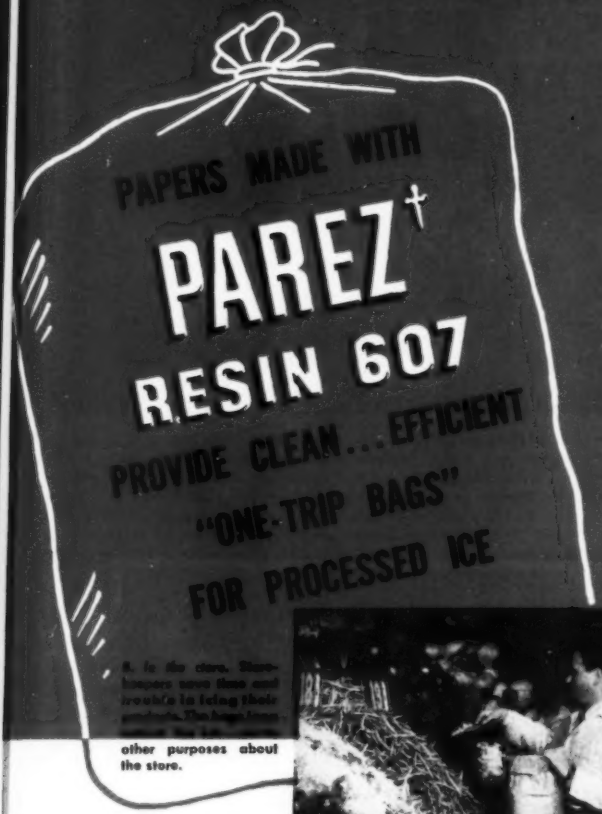
Great Northern Paper Company—Net profit for six months ended June 30 was $2,080,639 as against $981,885 for the same period in 1946.

Mosinee Paper Mills Company—Net profit for the year ended May 31



Photo

Wet Strength Paper Scores Again... in a new "BIG DEMAND" item!



1. In the plant. Popularity of the new bags begins with the ice manufacturer. Filling and weighing, for instance, become one quick, simple operation.

2. On the truck. Delivery is more efficient. Bags remain dry and easily handled...there's no pick-up of used containers to bother with.

3. In the home. Housewives ... like hotel and restaurant chefs ... find chipped ice that comes in the handy bags as sanitary as the food itself.

4. In the store. Storekeepers save time and trouble in icing their products. The bags keep ... other purposes about the store.

Photos courtesy Union Bag & Paper Corp.

4. *At the refreshment counter...* in stores, hotels, restaurants or in the home, cubed ice that's packaged for easy handling is appreciated.

Yes, Cyanamid's PAREZ Resin 607 has helped create another big, profitable market for paper manufacturers! Now it's "one-trip" wet-strength paper bags for the efficient marketing of cubed and sized ice to homes, restaurants, hotels and food stores.

No longer must the ice manufacturer buy and maintain returnable-type containers that have to be sterilized and stored for future use. Customers, too, like these strong, drip-proof paper bags that make processed ice easy to buy and handle.

Along with their increased sales and profits, paper manufacturers find PAREZ Resin 607 extremely easy to use. Simply added during the paper manufacturing process, it imparts increased wet and dry strength . . . improved tensile and bursting strength . . . added folding resistance . . . enhances the versatility and usefulness of the paper in general.

Is your business paper or packaging? Then consult Cyanamid's Technical Service representatives. They'll gladly show you how PAREZ Resin 607 can improve *your* products . . . open to *you* the new and profitable markets this remarkable resin is finding for paper.

WHEN PERFORMANCE COUNTS... CALL ON CYANAMID

Industrial AMERICAN
Chemicals CYANAMID
Division COMPANY

30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

Waxes • ALWAX** Sizes • WAXOL**
Sizes • Resin Size • PAREZ* Resins
Synthetic Resins • Casein • Alum
Sulfonated Oils • Fillers • Defoamers
Soda Ash • Caustic Soda • Salt Cake
Acids • Clays • AEROSOL*
Wetting Agents • CAL
MICRO** (Calcium Car-
bonate), and other Paper

DISTRICT OFFICES: Boston, Massachusetts; Philadelphia, Pennsylvania; Baltimore, Maryland; Charlotte, North Carolina; Cleveland, Ohio; Chicago, Illinois; Kalamazoo, Michigan; Detroit, Michigan; St. Louis, Missouri; Azusa, California; Seattle, Washington. In Canada: Dillons Chemical Company, Ltd., Montreal and Toronto.

†Trade-mark of American Cyanamid Company covering its synthetic resins for use by the paper industry. The processes under which PAREZ is applied in the production of wet-strength paper are covered by U. S. Patents Nos. 2,291,079, 2,291,080 and 2,345,543 and U. S. Patent Application Serial No. 453,032.

*Reg. U. S. Pat. Off. **Trade-mark

For low-cost chemical equivalent of distilled H_2O . . . FILT-R-STIL* Demineralizing Units.

was $538,354 as against $221,990 for the preceding fiscal year.

Riegel Paper Corporation — Net profit for the first 28 weeks of 1947 was $634,607 as against $632,761 for the same period in 1946.

Sorg Paper Company—Net income for the first six months of 1947 was $743,922 as against $167,106 for the same period in 1946.

United Paperboard Company—Net profit for the year to May 31 was $1,262,628 as against $87,326 for the same period the previous year.

Paper Mill Corporate Changes

Gaylord Container Corporation—Announcement has been made that the company will redeem from its own funds as of October 1, its 3¼ per cent debentures in the amount of $4,400,000. With the redemption of the entire issue of debentures and the recent call of the preferred stock, the company's outstanding capitalization will consist solely of common stock.

York Paper Manufacturing Company—Joseph DiCandia, New York waste material dealer, has bought the York Paper Mfg. Company for $300,000 cash and a 2½ per cent mortage for $283,000.

New York Stock Exchange—Stocks

	Closing Prices Sept. 25	Aug. 25
A.P.W. Products	4¼	4
Celotex	28⅜	27⅛
Same Preferred	20½	*20⅛-20⅜
Certain-teed Products	16⅞	16¾
Champion P & F Co.	23¼	24
Same Preferred	*106-107	109½
Container Corp.	41⅜	40¼
Same Preferred	*101-102¾	103½
Cont. Diamond	10⅜	10¾
Crown Zellerbach	30½	31½
Same Preferred	105	106¼
Same $4 Preferred..	*115-118	118½
Dixie Vortex	*37½-39	38
Same "A"	62½	53
Robert Gair Co.	8¾	8¼
Same Preferred	*19¾-20	19¾
Gaylord Container ...	20⅛	19½
Same Preferred	*113-124	*110-120
International Paper ..	51⅜	46¾
Same Preferred	105¾	*107-109
Kimberly-Clark	23⅝	24¾
Same Preferred	109½	*109¾-110¼
McAndrews & Forbes.	*36½-37	37⅝
Marathon	22¾	24
Masonite	*50¼-50½	*53½-54⅜
Mead Corp.	20¼	20¼
Same Preferred	94½	96½
Same 2nd Preferred	45⅞	*45-47½
National Container ..	15⅝	14
Paraffine Cos.	69	67
Same Preferred	*106½-109	107
Rayonier, Inc.	27¼	26½
Same Preferred	*37¼-37⅞	37½
Scott Paper	*46-46⅜	*46-47
Same Preferred	*102-102¾	103⅜
St. Regis	10	10⅛
Sutherland Paper	*38½-39	*41¾-42½
Union Bag & Paper...	33⅛	34⅝
United Paperboard ...	16⅜	14½
U. S. Gypsum.....	98	100¾
Same Preferred	187	*187½-190
U. S. Wall Paper.....	6⅞	8⅛
Same Preferred ...*42-45		*44½-46½
West Va. P & P Co..	42½	40
Same Preferred	112	*110-111

New York Stock Exchange—Bonds

Celotex 3½%	103⅜	...
Champion P & F Co..	103⅜	...

New York Stock Exchange—Stocks

Am. Writing	...	9
Great Northern	44	44⅝
Taggart	9⅞	9⅞

*Closing Bid and Asked Prices.

Two longest-service veterans of Kimberly-Clark Corporation are shown with a certificate of membership in the company's newly launched quarter-century club. At the left is Ernst Mahler, executive vice president, and at the right, Cola G. Parker, president of Kimberly-Clark. Next to Mr. Parker is Richard Roudebush, whose 37 years of service leads at the Atlas mill. Beside Mr. Mahler is William DeBruin, who began work at the Kimberly mill in 1903. At the first of four dinner meetings held by K-C to honor employees with 25-yr. service records, Mr. Mahler was welcomed as the first member of the quarter-century club

KIMBERLY-CLARK LAUNCHES 25-YR. CLUB TO MARK ITS 75TH ANNIVERSARY YEAR

A 75th anniversary program was launched by Kimberly-Clark Corporation, Neenah, Wisconsin, in mid-September.

At the first of four dinner meetings, held September 9 at the North Shore Gulf Club, the company paid tribute to long-service employees of its Kimberly and Atlas mills. When the four dinner meetings have been held, 409 employees, representing 12,250 years of service, will have been honored and given certificates of membership in the quarter-century club. In addition to personalized certificates of membership, all long service employees are to receive $100 United States Saving Bonds.

At the first dinner meeting, Ernst Mahler, executive vice president, was officially welcomed as the first member of the new quarter-century club. Cola Parker, K-C president, has announced that all retired employees with twenty-five or more years of service will be remembered with a gift.

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▶▶▶ A THREE-DAY celebration, including plant tours and demonstrations of new equipment and processes, marked the sixtieth anniversary of business for the Gilbert Paper Company at Menasha, Wisconsin, last month. Founded in 1887, the Gilbert Paper Company was the first fiber content paper mill west of the Alleghanies.

▶▶▶ WITH THE $5,000,000 postwar program of Pacific Mills, Ltd., almost completed, an additional expenditure of $550,000 for improvements at the Ocean Falls (B. C.) plant has been planned. The present 2½-ton capacity rotating digesters are to be replaced by new heavy duty rotating digesters of 3½-ton capacity, thereby increasing kraft board production from 140 to 175 tons a day. Other improvements include asbestos-lined aluminum sectional hoods for the newsprint machines, a spherical hot acid accumulator for the sulphate mill, and additional employee housing units.

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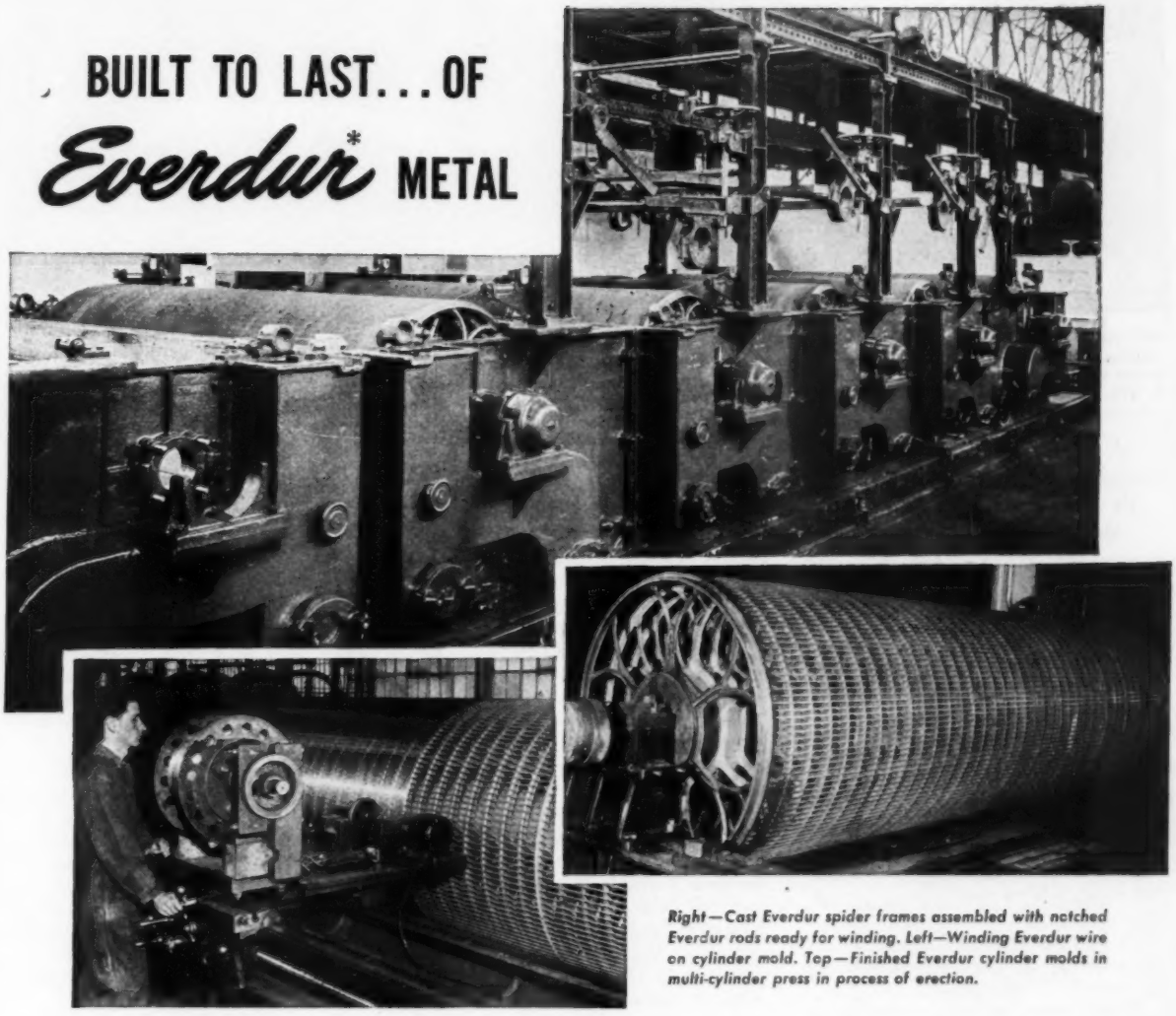
SIRRINE & COMPANY NAMED AS COOSA RIVER ENGINEERS

The signing of an engineering contract with the J. E. Sirrine æ Company of Greenville (S. C.) for the construction of the $30,000,000 pulp and paper mill in Childersburg, Alabama, is the latest news of the project of the Coosa River Newsprint Company (Cf. P.I. and P.W. August, 1947).

Kimberly-Clark Corporation, which will operate the plant, acted as a representative for Coosa River in arranging final contract details with Allen S. Bedell, senior partner of the engineering firm. According to Edward L. Norton, president of Coosa River, the Sirrine company has been doing preliminary work on the Coosa River development since its inception.

BUILT TO LAST... OF *Everdur** METAL



Right—Cast Everdur spider frames assembled with notched Everdur rods ready for winding. Left—Winding Everdur wire on cylinder mold. Top—Finished Everdur cylinder molds in multi-cylinder press in process of erection.

CYLINDER MOLDS for the paper board machine in course of assembly above, are fabricated completely from Everdur* Copper-Silicon Alloys by The Bagley and Sewall Company of Watertown, New York.

Spider frames are cast of Everdur and tied together with ⅜" Everdur rods. The rods are notched and the molds are completed with the winding of miles of ⅛" Everdur wire.

The result is a mold engineered to last—combining exceptionally high strength with excellent resistance to corrosion.

Everdur alloys are available for either hot or cold working, ready weldability and free machining. These advantages have made Everdur a favored metal for save-all pans, head boxes, flow boxes, tanks, vats and linings and for screws, bolts, clamps and rustless hardware items in general. For information on properties of Everdur, send for Anaconda Publication E-5.

*Reg. U. S. Pat. Off. 47268

ANACONDA

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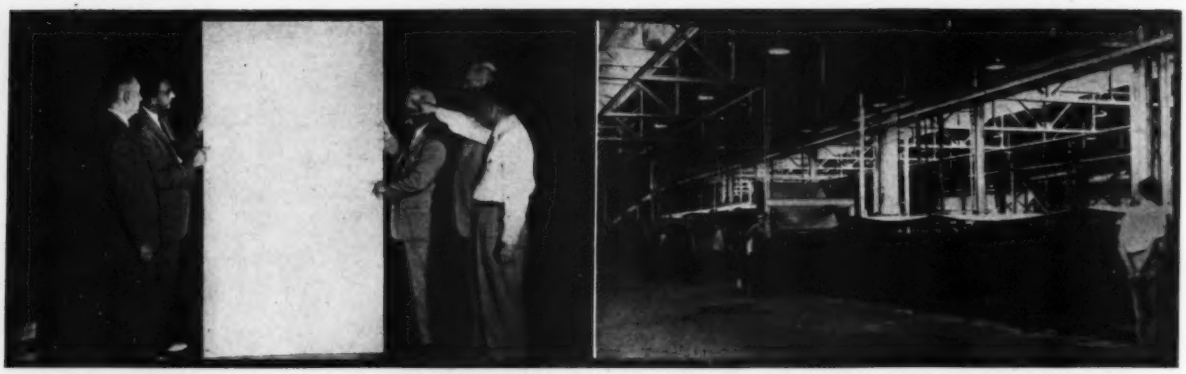
COPPER & COPPER ALLOYS

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD. *New Toronto, Ont.*



LEFT—One of the first pieces of corrugated board produced in the new box plant of Union Bag & Paper Corp., Savannah (Ga.), is inspected by (L to R) Robert W. Groves, chairman Savannah Industrial Committee, and a member of the board of directors of Union Bag; Charles J. Musante, exec. secretary of the Committee; T. T. Dunn, resident manager of Union Bag Savannah plant; Col. E. George Butler former vice chairman of the Industrial Committee; and O. C. Fentress, superintendent of the box factory . . . RIGHT—Section of the corrugating machine in the new paper box plant. It is fed from 3,000 lb. rolls of liner board produced in the company's Savannah paper mill

PRODUCTION UNDER WAY IN THE NEW BOX PLANT OF UNION BAG & PAPER CORP.

The new box plant of the Union Bag & Paper Corporation, Savannah, Georgia, was put into operation on September 18. The productive capacity of this plant is approximately 5,000 tons of corrugated sheets and boxes per month.

The plant is located adjacent to the main pulp, paper and paper bag operations and is fully integrated with them. Steam and power and paperboard for its machines will be supplied by the paper mill. The new building is modern in design, of cement block and steel construction. It covers approximately four acres. The equipment includes two 85-in. corrugators and auxiliary box-making and printing equipment.

Other recent expansion projects of the company include the installation of electric precipitators to reduce smoke and odors, the addition of 200,000 feet of floor space to the bag manufacturing division, installation of additional pulping facilities and power units, and the No. 5 paper machine which represents the latest in design and refinements. This machine is designed especially for the production of specialty and multiwall bag paper.

The new bag factory extension is now completed and is occupied by the multiwall and printing departments. A second floor will be erected over this extension which will be on a level with the paper mill machine room floor. It will be used for bag paper storage.

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▶▶▶ LOUISIANA'S STATE Board of Commerce and Industry recently granted a $6,000,000 ad valorem tax exemption to the International Paper Company for the construction of new mills at Bastrop and Springhill.

▶▶▶ PREPARATORY WORK for the excavation of Celanese Corporation of America's $15,000,000 pulp mill at Watson Island, British Columbia, has been started by Northwest Construction Company. The excavation job will be handled by B. C. Bridge and Dredging Company. Surveys of the territory between Prudhomme Lake and the mill site for a proposed water line have been completed by F. C. Underhill, and the results have been sent to the designers in Montreal.

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▶▶▶ ANNOUNCEMENT OF the purchase of the Brown Corporation's Bersimis Timberlands in Quebec Province by Donnacona Paper Company, Montreal, and Anglo-Canadian Pulp and Paper Mills, has been made. Approximately 750 additional square miles of timberlands, in part freehold and in part under timber cutting licenses, were obtained.

◆

ALCOHOL PLANT TO USE WASTE SULPHITE LIQUOR FROM CANADIAN MILL

Commercial Alcohols, Ltd., of Montreal recently announced it will construct a new $2,500,000 plant for the production of about two million gallons of ethyl alcohol a year from waste sulphite liquor of Canadian International Paper Company's Gatineau mill. This by-product at present is being poured into the river.

The design of the plant calls for processing a maximum of 700,000 gallons of sulphite liquor every 24 hours. The process to be used will be a variation of one that has been used in Sweden, according to H. C. Kerman, vice president and general manager. An innovation will be the use of a vacuum distillation method with apparatus chiefly of stainless steel.

DU PONT SELLS PAPER MILL IN RUSSELL (MASS.) TO A NEW CORP.—TEXON, INC.

A new corporation, Texon Incorporated, has purchased from the E. I. du Pont de Nemours Company the paper mill in Russell, Massachusetts, which was acquired by Du Pont in 1942, after operating it on lease from the Crescent Paper Corporation since 1939.

Du Pont representatives stated that their chief reason for the sale of the property was that the original purposes for which it was purchased no longer exists. It was acquired primarily for the commercial development of a chemically impregnated nonwoven coating base which it was hoped would have wide usefulness in Du Pont coating plants at Newburgh, New York, and Fairfield, Connecticut.

Three of the principal officers of Texon, Incorporated, are men who have been active in the operation of the plant, and are leaving Du Pont to assume their new posts. They are M. J. Vittengl, plant manager, who becomes president of the new firm; J. J. Uber, chief chemist, who becomes vice president in charge of research; and D. F. Mulvihill, production manager, who becomes vice president in charge of production. David R. Schoales of Russell joins the group as treasurer.

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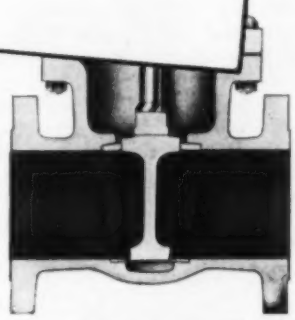
▶▶▶ A GROUNDWOOD machine with a productive capacity of 100 tons daily will be installed in Bowater's Newfoundland Pulp & Paper Mill at Corner Brook, according to Eric Bowater, president. The new machine, which will handle 30,000 cords of pulpwood annually, is expected to be in operation by the early summer of 1949. The wood will be taken from the annual export quota.

Streamline YOUR PIPELINES WITH OIC PACE SETTER IN VALVES

Free-Flow OIC Steel Valves Cut Pumping Costs . . . Give You *Maximum* Flow With *Minimum* Pressure Drop!

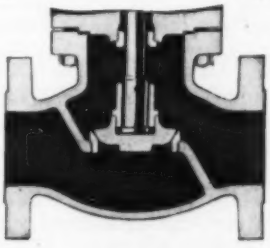
Streamlined.....

OIC GATE VALVES with flanged and welding end provide straight-through flow without recesses or pockets between the valve ports and seat openings. Screwed end valves are designed for the smoothest possible flow with a threaded joint.



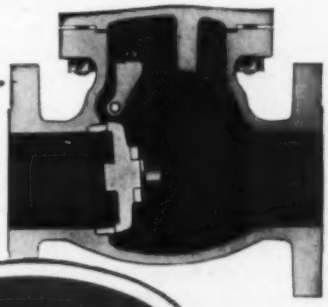
Streamlined.....

OIC GLOBE AND ANGLE VALVES are designed with a disc guiding in all pressure classes to eliminate the necessity of a bridge across the seat opening, thereby reducing pressure loss through the diaphragm to a minimum. Flow of the line fluid, whether gaseous or liquid, is expedited.



Streamlined.....

OIC CHECK VALVES have bodies designed for unobstructed flow where the disc is in the wide open position. Streamlined internal contours from port to port reduce turbulence and consequent pressure loss to a minimum.



SEND FOR NEW CROSS REFERENCE CHART

You can look at the figure number of the valve on the line and by referring to the Chart tell quickly the exact OIC Valve to order to replace it. To reserve your copy, write to:

THE OHIO INJECTOR CO., WADSWORTH, OHIO.

O-1047-1

OIC VALVES
STEEL-IRON-BRONZE

FOURTH BOARD MACHINE INSTALLED AT PLANT OF PACIFIC PAPERBOARD CO.

A fourth paperboard machine has just gone into production at the plant of the Pacific Paperboard Company, Longview, Washington. This machine, a used fourdrinier, produces board at the rate of 1½ tons per hour. It was installed under the supervision of William Ball, company master mechanic.

The machine trims 81 inches on 20-point board and 79 inches on nine-point, and it can be used to manufacture newsprint. It operates at a top speed of 500 fpm, but at present is being held to 300 ft. The machine has a 50-ft. wire with suction couch roll, thirty-eight 36 by 86-in. dryers, and was in operation at Lawrence, Massachusetts, until May 1, when it was dismantled and shipped to Longview. It weighs 1,000,000 pounds. The machine will run from 6- to 24-point, single-ply board for corrugating medium, or boards up to 25-point which need no particular grain. E. E. Flood, company president, states that at present the machine is producing nine-point and will produce such indefinitely.

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▶▶▶ RECENT GUESTS at a luncheon given by Crane & Company of Dalton, Massachusetts, were 100 members of the Engraved Stationery Manufacturing Association during their annual convention in Pittsfield, Mass. A tour of the Crane stationery division followed the meal.

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▶▶▶ THE PLANT OF Osborne Paper Manufacturing in Fulton, New York, has been sold to the Philippine government for $51,000. The plant will be shipped to Manila and reassembled to provide Manila with its first paper manufacturing facilities.

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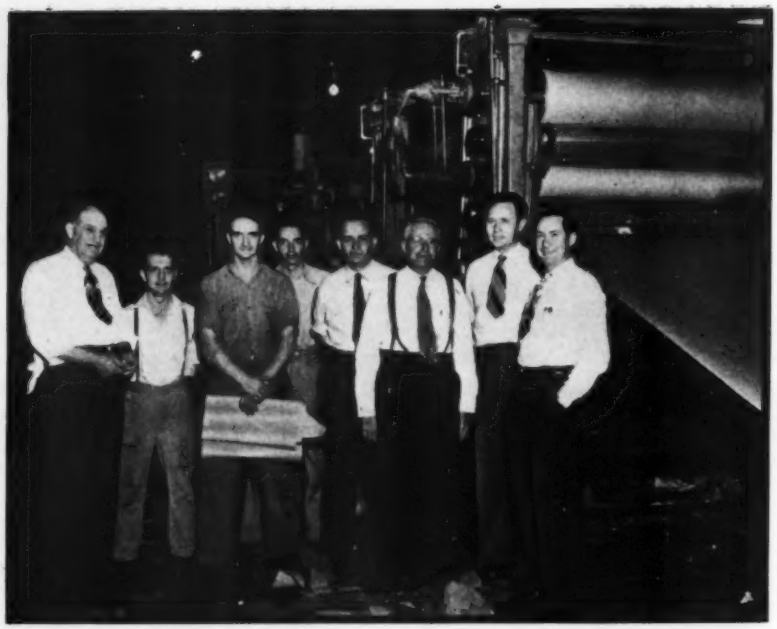
▶▶▶ THE ANNUAL REPORT of West Virginia Pulp and Paper Company for the second consecutive year was judged as best of the pulp and paper industry in the final considerations of the Independent Board of Judges in the Financial World Annual Report Survey. In this industrial classification for 1946 reports, Mead Corporation was runner-up, while Oxford Paper Company came in third.

◆

▶▶▶ A LEASE for the Pine Bluff Arsenal, Pine Bluff, Arkansas, has been executed to the Hammond Bag and Paper Company (Wellsburg, W. Va.). The paper used by the company, which expects to employ 75 persons, will be supplied by Arkansas mills.



Standing by the fourth papermaking machine to go into operation at the Longview (Wash.) plant of Pacific Paperboard Co. are: (L to R) E. E. Flood, company president; Arnold Maahs, assistant superintendent; Chester Mason, back trimmer; Orville Latimer, assistant superintendent; H. H. James, personnel manager; Charles Ruble, Los Angeles, president of the Associated Paper Box Co. in Longview; H. C. Armstrong, purchasing agent; and T. J. Kennedy, general manager

DUTIABILITY OF VARIOUS PAPER AND PULP PRODUCTS STUDIED BY IMPORT COMM.

A mixture of pulp from Canada, consisting of 50 per cent sulphite and 50 per cent groundwood, is under question as to its dutiability. The Import Committee of the American Paper Industry believes that such a product is a manufacture of pulp and dutiable, and not duty free as the pulp of commerce. The sheets were not mutilated upon importation.

Flax waste for papermaking is believed by the Import Committee to be duty free as paper stock, not dutiable as flax waste.

Paper imported from France at San Francisco is under scrutiny, for the determinaion of its classification. It may be dutiable as starch coated paper at 5 cents per pound and 15 per cent, or as vegetable parchment at 2 cents per pound and 10 per cent. The Import Committee has asked the assistance of domestic manufacturers in determining the true character of the paper.

Paper described as coated paper, shipped from Scotland for cigarette tippings, has been classified as work paper at 30 per cent.

A Philadelphia bag manufacturer has been granted refund of 99 per cent of the duty paid on paper imported from Scandinavia and re-exported in bag form.

Pacific Coast importers of asphalt duplex paper have abandoned their protest against the rate of duty levied by Customs officials. The material had been claimed to be dutiable at 10 per cent as sheathing paper, but was classified for duty at higher rates for sulphite and kraft wrapping paper. Three of the cases, which have been pending in United States Customs Court since before the war, were at Los Angeles, three at Tacoma and thirteen at San Francisco.

◆

▶▶▶ A SHIFT FROM coal to fuel oil in its power plant is planned by Whiting & Company of Holyoke (Mass.). The project includes installation of oil-burners on eight boilers which have a combined capacity of 1,600 horsepower. About 100,000 gallons of oil will be stored in underground tanks. The power plant produces steam both for processing and for operation of the steam turbines which run the mill's two paper machines and other equipment.

◆

▶▶▶ CONSTRUCTION has been started on a $100,000 wastepaper storage warehouse in Richmond, Virginia, for the Manchester Board and Paper Company, Incorporated. The warehouse, a one-story steel structure, is being built on Mayo Island in the James River near the company's present storage building.

NOW, GREASES THAT RESIST BOTH HEAT AND WATER

WERE YOU ever faced with the problem of lubricating bearings which operated under extremely wet conditions and, at the same time, were subjected to widely varying temperatures? If so, you probably had to choose between a high-temperature grease with poor resistance to water or a water-resistant lubricant with only fair resistance to heat.

Standard Oil's new Stanolith greases end all need for compromise. A lithium soap grease has unusual characteristics which conventional soda soap or lime soap greases cannot duplicate. Stanolith greases resist the washing action of water because they are insoluble in water and also are extremely adhesive. They resist heat because they are made from an extremely stable base oil and a high-melting point soap, and contain an oxidation inhibitor.

Where you have a heat-and-water problem or where costly machines demand the best possible lubrication, try Stanolith. A Standard Oil Lubrication Engineer will help to make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Performance Characteristics of Stanolith Greases

- operate over a wide range of temperatures—have high dropping points.
- have excellent water resistance.
- have unusual mechanical stability—a minimum of oil evaporation and separation.
- contain effective oxidation inhibitors
- are corrosion resistant.

Two grades of Stanolith Greases are available: No. 42—with a No. 1 consistency, and No. 57—with a No. 2 consistency.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Aerial view of Marathon Corporation's new carton plant at Menasha, Wis. The building is more than 300 ft. wide and 800 ft. long

NEW MARATHON PLANT ENABLES EXPANSION OF CARTON MANUFACTURING

A new plant housing the expanded carton and folding box manufacturing operations of Marathon Corporation, Menasha, Wisconsin, is now in production.

The building, which consists of one story and basement, contains a total of 304,000 square feet of floor space. It is constructed of reinforced concrete with brick and concrete exterior in a U-shaped layout. Many advanced engineering and production ideas are incorporated in the construction, layout, floor plan, and arrangement of operating equipment in the new plant. An interesting and unique feature of the new installation is an unusual system of dust control to insure the highest possible degree of cleanliness in the manufacture of Marathon food packages.

The new building houses all carton production units, carton raw material storage, warehousing for finished cartons, a die room, roller coating department, maintenance machine shop and a parts crib. Raw material storage, the location of production units and the storage of finished cartons are so arranged that the most modern principles of material handling govern the flow of materials through the plant.

In addition to the manufacturing and warehousing units, various plant administrative offices and nine operating departments will also be housed in the new building. These departments include: art, traffic, purchasing, standards, plant personnel, plant management, plant accounting, time study, and production control.

The manufacturing operations, housed in the new building, are part of Marathon's completely integrated over-all business operation. Controlling over 4,000 square miles of timberland in Canada from which Marathon produces its own pulp, the company manufactures finished paper which it converts into packages and packaging materials for the food industry. The company's manufacture of carton and folding boxes has expanded greatly during the past ten years, making the new plant necessary to handle present manufacturing activities and provide for anticipated growth during the immediate future. Departments moved to the new building permit the expansion of other manufacturing activities in the building space formerly occupied by those departments.

For the convenience of employees, modern locker facilities, comfortable restrooms and lunchrooms are provided in the new plant. A completely equipped first-aid unit will administer to employee needs.

◆

▶▶▶ A CONTEST was conducted recently among the salesmen of the Charles F. Hubbs Company, New York, to see who could sell the most Nibroc Aqualized Towels, a product of the Brown Company (Berlin, N. H.). In order to qualify, each man had to open 25 new accounts and sell 100 cases of towels. Top man was Jimmy Donohue, a former Marine Corps flyer, who lost one of his hands in action.

COATED PRINTING PAPER NOW MADE AT WEST LINN BY CROWN ZELLERBACH

Production of coated printing paper has been started by Crown Zellerbach Corporation at its West Linn, Oregon, plant, climaxing three years of planning and erecting the $5,000,000 buildings and equipment. The company also is installing a second machine for the production of coated paper.

The new machines were designed and built by the Beloit Iron Works of Beloit, Wisconsin. More than 18,000 tons of clay for coating purposes will be shipped annually from Georgia. Suction systems have been installed to move the clay from rail siding to a barge on the Williamette River and from the barge into the mill. A water filtering system has been installed at the mill to reclaim fiber and filler which has been escaping into the river.

The mill currently employs 1,030 persons. The output of 100 tons of paper a day is shipped to the Los Angeles printing plant of *Time* and *Life* magazines.

◆

▶▶▶ TWO THOUSAND Hammermill employees attended the company's annual picnic and outing at Waldameer Park recently in Erie, Pennsylvania. A formal ceremony for 525 Hammermill employees who have been employed there from 20 to 49 years was held in Rainbow Gardens. Principal speaker of the evening was President Norman W. Wilson, who has a service record of 46 years with the company.

◆

ST. REGIS CO. ACQUIRES 60-YEAR RIGHTS TO PINE IN THE SUWANEE FOREST

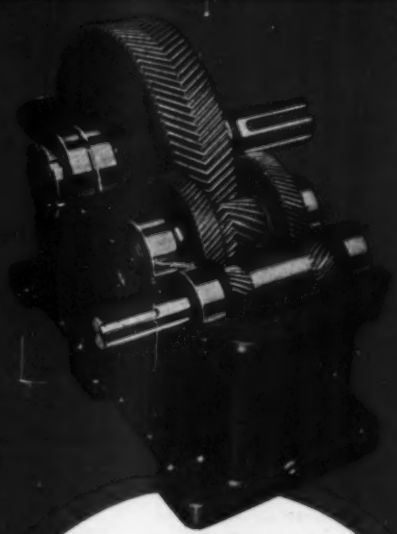
Acquisition of the rights to manage and utilize 208,000 acres of long leaf and slash pine in Georgia's Suwanee Forest, has been announced by the St. Regis Paper Company, New York City. The contract gives St. Regis the right to utilize for 60 years a growth estimated to be 150,000 cords annually. It will be used to supply pulpwood for the production of bleached and unbleached sulphate pulp from which will be made paper and paperboard for conversion into multiwall bags and other types of industrial packaging.

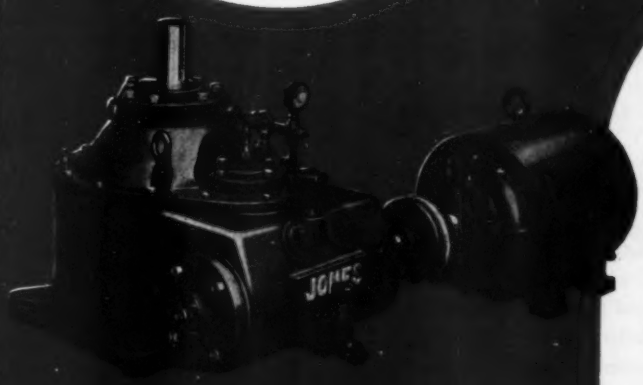
The Suwanee Forest is bounded on the east by the Suwanee River. The area is served by two railroads and the tracts are within 65 miles of shipside with favorable freight rates. Owner of the tract is the Superior Pine Products Corporation, Fargo, Georgia.

To help you solve THE PRODUCTION PROBLEM

JONES WORM-HELICAL SPEED REDUCERS for vertical shaft drives

● These machines fill a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, ore roasters, bending rolls, etc., requiring a vertical shaft drive. Built in standard ratios in various types of assemblies ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings Jones Bulletin No 75 covers complete details.





JONES HERRINGBONE SPEED REDUCERS

● Jones Herringbone Speed Reducers are built in single, double and triple reduction types with a large range of ratios and ratings making it possible to fulfill all ordinary requirements by the selection of standard units.

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout.

Catalog No. 70 contains 128 pages of detailed information on the application of these speed reducers.

"JONES DRIVES FOR INDUSTRY"

is the title of a 16-page bulletin that may be helpful in giving you a broad picture of the Jones products, engineering services and manufacturing facilities that are available.

Just ask for Bulletin No. 80

W. A. JONES FOUNDRY & MACHINE CO.
4439 Roosevelt Road, Chicago 24, Illinois

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

LOCAL NEWSPRINT SUPPLY SOUGHT BY NEW ZEALAND

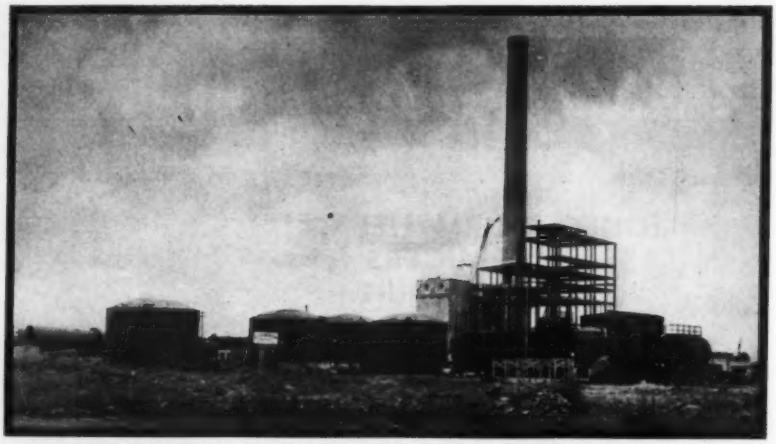
Experiments in producing newsprint from locally grown *pinus insignis* are under way in New Zealand. The tree grows rapidly and several large forests now are reaching maturity. Because of the impossibility of obtaining sufficient supplies of newsprint from Canada, newspapers in the dominion are rationed to between 10 and 14 pages daily, and an additional local supply would be of great assistance.

Although lower grades of paper and cardboard are already produced in New Zealand, the mills there are not capable of producing newsprint. Therefore a shipment of *pinus insignis* was sent to mills in Tasmania. The quality of the paper is good and it seems capable of being improved by treatment into high-grade newsprint.

◆

GARDNER-RICHARDSON FORMS MILK CARTON CORPORATION

Formation of Dairypak, Inc., a new corporation for the manufacture of paper milk bottles, by the Gardner-Richardson Company, Middletown, Ohio, and an associate has been announced. It was also made known that a plant in Cleveland had been purchased but that very little of Gardner-Richardson's equipment would be transferred to Cleveland.



The plant of the Southern Paper Board Division of Robert Gair Co. is rapidly taking shape at Port Wentworth (Ga.) near Savannah on the Savannah River

Machinery now being used for the manufacture of milk cartons will fabricate other types of cartons being manufactured by Gardner-Richardson. The new company will be under the management of the Gardner-Richardson Company.

◆

▶▶▶ MORE THAN 1,100 employees of The Brown Company (Berlin, N. H.) have a record of 25 years of continuous service, it was announced recently.

ALABAMA GETS FIRST OF AFPI STATE-WIDE PROJECTS

In co-operation with the American Forest Products Industries, the Alabama Forestry Council has selected W. R. Sizemore, Alabama Division of Forestry, to direct a "Trees for Alabama" campaign. Assisting Mr. Sizemore is an advisory committee consisting of H. M. Stauffer, Alabama state forester; John M. Ward, Alabama State Chamber of Commerce; and Paul Swarthout, U. S. Forest Service, Montgomery.

The project, addressed primarily to small woodland owners, will seek to interest such owners in better forest management for their own profit. It also will encourage provision of adequate instructional materials and services to woodland owners.

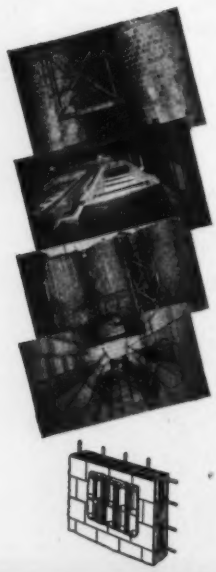
◆

▶▶▶ THE MANAGEMENT of the West Virginia Pulp and Paper Company, Mechanicville, (N. Y.), has been authorized by the board of directors to prepare a company-wide contributory pension plan for its hourly paid employees. It is estimated by the company that the plan will cost about $3,000,000 for past services alone and will require large annual payments for the company.

◆

▶▶▶ THE OPENING OF a multiwall paper bag sales office in Minneapolis to service the flour milling industry in that territory has been announced by the St. Regis Sales Corporation, Chicago. The office, under the supervision of Harry A. Hughes, is located at 2013 Foshay Tower, and it brings to 23 the number of offices that St. Regis maintains throughout the country for the sale of heavy duty paper bags to industries requiring them.

Stebbins Semtile Tanks



. . . Have saved pulp and paper manufacturers many thousands of dollars through keeping stored or processing materials clean and free from contamination.

Stebbins Semtile tanks are erected from Semtile-blocks which are a hollow salt glazed tile, cored to permit the use of both horizontal and vertical reinforcing. The cores are solidly filled with concrete forming a reinforced concrete wall faced on both sides with Stebbins glazed tile. This hard, durable, glazed surface is easy to clean and permits free flowing of stock. Semtile construction, because of its long life and low maintenance, is excellent for storage tanks, bleach tanks and chests.

Consult a Stebbins engineer on your next tank or lining problem.

Stebbins Engineering and Manufacturing Company
EASTERN BOULEVARD, WATERTOWN, NEW YORK

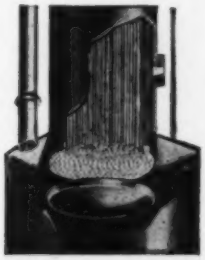
CORROSION RESISTANT. Recent survey showed Timken 5% nickel steel tubes gave up to 300% more service than carbon steel tubes in concentrated black liquor.

UNIFORM QUALITY is assured by the Timken Company's complete control of production from melting through finished tube.

PRESSURE TESTED. Each tube must withstand hydrostatic pressure test of 1000 psi before shipment.

EASY FLARING. Tube sections must withstand expansion to 20% increased I.D. without showing flaws or cracking.

SEAMLESS. Tubes are made by the seamless process—melted, rolled, pierced and finished entirely by the Timken Company.



LONG LASTING. In actual service, Timken 5% nickel steel tubes often give 4 times longer life than carbon steel tubes.

How Timken 5% nickel tubes cut evaporator costs

SHOWN above are a few of the reasons why so many paper mill operators specify Timken 5% nickel steel evaporator tubes.

They all add up to one basic reason—Timken 5% nickel tubes give you maximum tube life per dollar invested. This means a three-way cut in evaporator costs: 1) downtime is reduced; 2) tube replacement costs are lowered; 3) tube sheet wear is reduced.

Timken 5% nickel steel for evaporator tubes is the result of eight years' intensive research by metallurgists of the Timken Company. This fine alloy steel proved to have the combination of properties best suited to black liquor evaporator services. And these properties are maintained in every lot of Timken 5% nickel tubes. That's because the Timken Company completely controls every step of production, fully tests the tubes before shipment.

It will pay you to consult our Technical Staff on your applications. Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

PLUS POWER in all sizes

another reason why Elwell-Parker Trucks are preferred

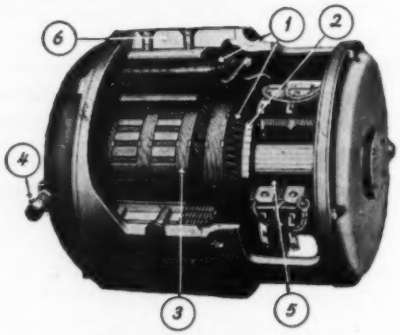
● Look at the "heart" of an Elwell-Parker truck—examine the powerful Class B Motors—and you will readily understand why they deliver more power for every dollar you invest in an electric truck. These motors, more expensive and worth it, are designed and built by Elwell-Parker exclusively for use in their trucks. The costly glass and asbestos insulation used in Class B Motors makes them practically indestructible and fire proof. They are built to handle up to 500% overload. Ball bearings are used throughout. No fuses to blow out at critical moments—none needed. Because they have more copper, greater commutator area and 8 brushes, (twice the usual number) these motors readily convert *all* the power delivered to them.

Ask your man for a complete account of these "plus values" in addition to the many others found only in Elwell-Parker Trucks. The Elwell-Parker Electric Company, 4241 St. Clair Avenue, Cleveland 14, Ohio.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893



Some "Plus Values" of a Precision Product

(1) All coils insulated with asbestos or glass.

(2) Leads welded instead of soldered. This new and advanced art produces a uniform circuit between coil and commutator.

(3) Special quality banding wire held firmly by special clips.

(4) New type bearing grease withstands very high temperatures. Demountable armature shaft.

(5) The 8 finger-type brushes (in 4 instead of 2 holders) are firmly held and easy to change. Brushes never stick. Low current density.

(6) Field ring machined inside and out to insure uniform magnetic field.

pH control

In the manufacture of fine paper, exacting pH control of the stock is vital to successful results. That is why only dependable chemicals of consistent uniformity and purity should be used. For alum and other paper-making chemicals that you can rely upon throughout your operations—

SPECIFY "GENERAL CHEMICAL"

ALUMINUM SULFATE

Standard—Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh; also Lump.

Iron Free—Ground, thru 8 mesh; also Lump, approximately 2½".

SODIUM SILICATE

Solutions: From	Wt. Ratio
38° to 60° Baumé	(Na_2O to SiO_2) from 1:2.00-1:3.40

Appearance: Opalescent to clear.

GENERAL CHEMICAL COMPANY products for the paper industry

- Aluminum Sulfate, *Standard and Iron Free*
- Muriatic Acid *(Hydrochloric)*
- Sodium Fluoride
- Sodium Silicate
- Sodium Metasilicate
- Glauber's Salt, *Crystal and Anhydrous*
- Salt Cake
- Sodium Sulfide
- Sodium Hyposulfite
- Sodium Sulfite, *Anhydrous*
- Sodium Bisulfite, *Anhydrous*
- Disodium Phosphate
- Trisodium Phosphate
- Tetrasodium Pyrophosphate
- Sulfuric Acid
- Nitre Cake *(Sodium Bisulfate)*
- Nitric Acid
- Chrome Alum
- Aqua Ammonia

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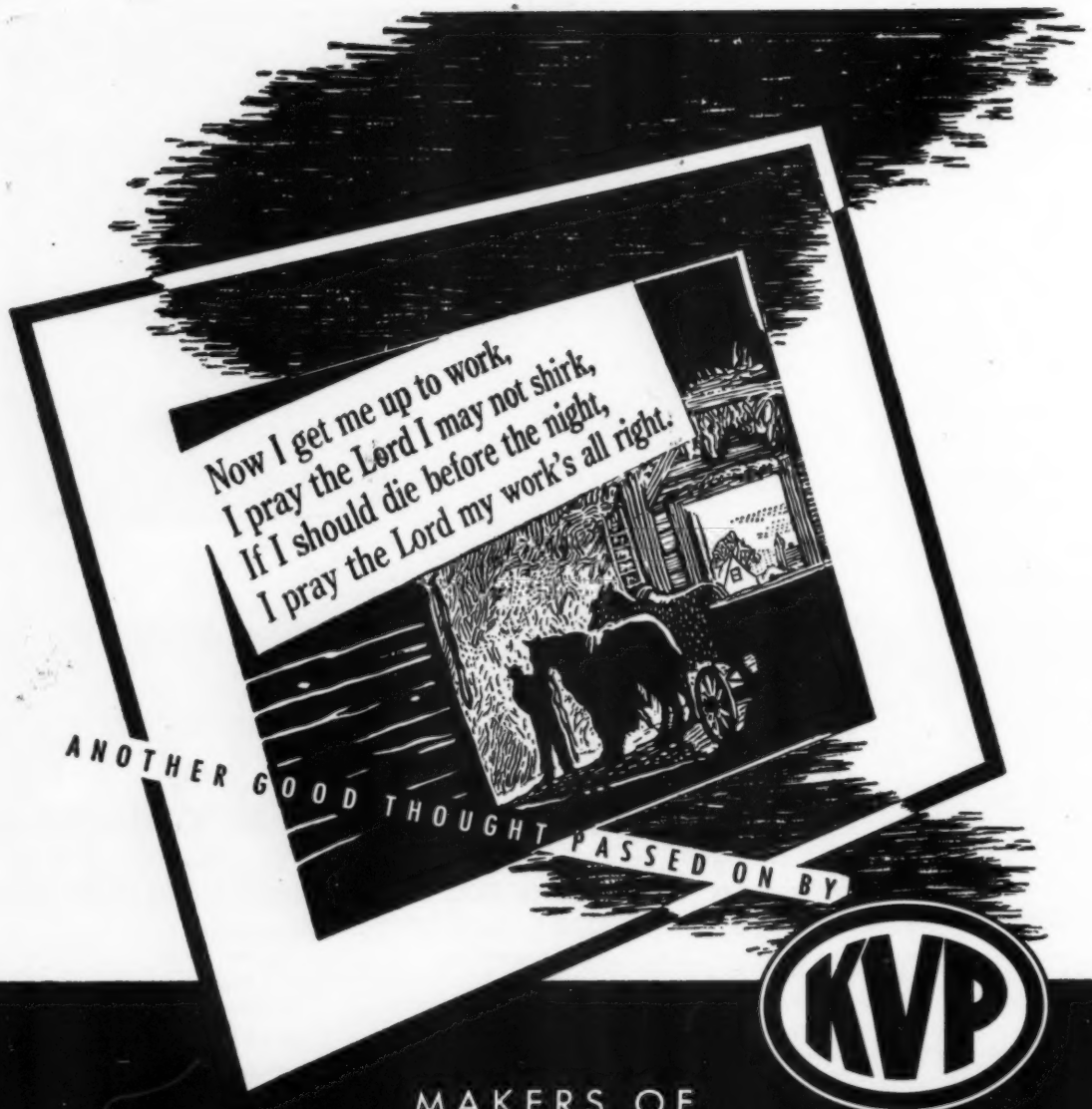
Now I get me up to work,
I pray the Lord I may not shirk,
If I should die before the night,
I pray the Lord my work's all right.
ANOTHER GOOD THOUGHT PASSED ON BY
KVP

MAKERS OF

PARCHMENT, WAXED, GREASEPROOF, LAMINATED, HOUSEHOLD AND WRAPPING PAPERS

KVP

KALAMAZOO VEGETABLE PARCHMENT COMPANY

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FORMULA FOR LONGER BEARING LIFE:

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DIESEL ENGINE BABBITT

Virgin-alloyed under scientific controls

to protect bearings from extreme stress.

Another triumph of Brake Shoe Research!

NBM

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PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

APPLETON FELTS

MAKE GOOD PAPER

APPLETON WOOLEN MILLS

APPLETON · WISCONSIN

PRECISION PLUS . . .

Each piece of which Bagley & Sewall paper machines are built is machined to precise measurements. It is this care in manufacture that makes possible the smooth, easy-running machines bearing the Bagley & Sewall trade mark--machines that make every kind of paper from news and board to tissue and high-quality book--efficiently. There are 77 years of research, development, and manufacturing experience behind the Bagley & Sewall machines being built today.

When considering new paper making equipment, get in touch with us.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

WATERTOWN, NEW YORK

WHY MONEL FACES BRING LONGER LIFE . . . LOWER COSTS

Many factors govern the life and performance of wire cloth faces and winding wire.

One of them is the wire itself.

Well known and proved is the corrosion resistance of Monel to pulps, paper mill stocks and white waters, caustic liquors and cleaning solutions of dilute muriatic and sulfuric acids.

Of equal importance is that Monel wire faces and winding wire are combined *safely* with bronze cylinder parts under corrosive conditions generally met in stock preparation.

Add to those qualities a rigidity almost twice that of bronze . . . add high strength, and resistance to abrasion and wear . . . and you have the reasons why mills report up to 10 years of continuous performance for Monel on washers, thickeners, cylinders and filters. And remember that Monel wire cloth is *lowest* in cost among wire cloths of comparable high strength and corrosion resistance.

For further information on Monel wire cloth, write for your copies of *Performance and the Reasons* and Bulletin C-3, *Monel, Nickel and Inconel in Pulp and Paper Mills.*

THE INTERNATIONAL NICKEL COMPANY, INC.

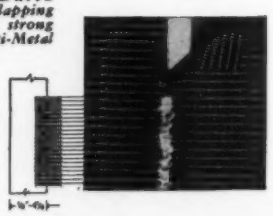
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE

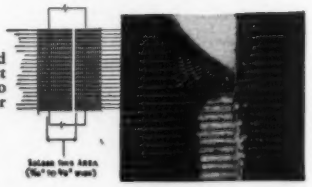
INCO

Monel

Seams for Monel faces are readily made by silver soldering or welding. This improved butt joint for corduroy and twilled Dutch weaves eliminates over-lapping and produces a smooth, strong seam. Developed by Multi-Metal Wire Cloth Co.



1 ¾" x .014" Monel strip spotwelded to under side of one end. ½" to project.



2 Bring cover around to close fitting butt joint. Solder cloth to Monel strip and over butt joint.

ESTABLISHED TYPES OF MONEL WIRE CLOTHS for PULP and PAPER MILL SERVICES

Pulp Thickeners	*Monel Backing Screens*	*Monel Top Screens*
VACUUM FILTERS	10, 12, 14 mesh*	40, 50, 60 mesh
SAVE-ALLS	10, 12, 14 mesh*	50, 60, 70, 80 mesh (12 x 64 corduroy cloth used without backing screen)
Unbleached Stock Washers		
VACUUM FILTERS	10, 12, 14 mesh*	30, 40, 50, 60 mesh
DECKERS AND CYLINDERS	12 x 64 mesh Monel and 14 x 88 mesh Monel corduroy cloth used without backing screen	
*Alkaline Bleached Stock Washers***		
VACUUM FILTERS	10, 14 mesh*	40, 50 mesh
BOARD MACHINE CYLINDERS	10, 12, 14 mesh	30, 40, 50, 60 mesh
BEATER WASHER		40, 50, 60 mesh
Lime Sludge Filters		
VACUUM TYPE	14 x 100 mesh Monel, 24 x 110 mesh Monel, 200 twilled Dutch weave Monel and "AU-Type" extra heavy braided weave Monel for filter cloth	
Water Filters		
CYLINDER AND VACUUM TYPE	12 x 64 mesh Monel, 14 x 88 mesh Monel 80 mesh twilled Monel (wire dia. 0.007") 100 mesh twilled Monel (wire dia. 0.005") 120 mesh twilled Monel (wire dia. 0.004") 120 x 140 mesh twilled Monel (wire dia. 0.004")	
CLAY AND COLOR STRAINERS	150, 200 and 325 mesh Monel	

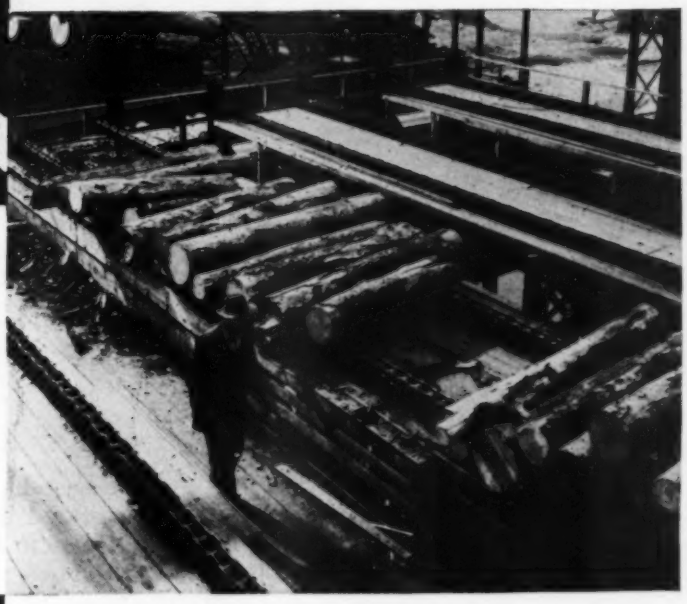
*10 mesh recommended for increased open area and drainage—**For chlorinated, acid-bleached stock washers Type 316 nickel-chromium-molybdenum alloy steel recommended.

This classification table is offered for your guidance through the courtesy of the Multi-Metal Wire Cloth Company, N. Y. *Write us for copies.*

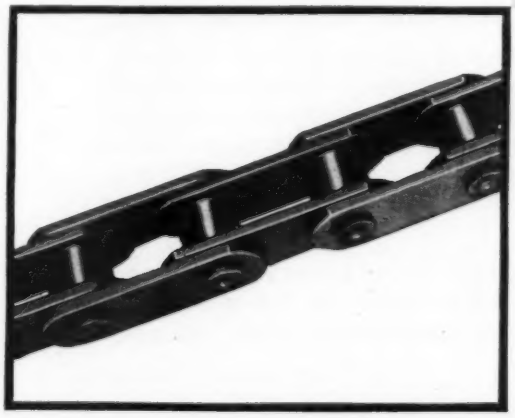
Need a chain with EXTRA strength?

Rex Chabelco

① **HERE'S THE CHAIN** that's *extra* tough . . . *extra* rugged for mill service. Rex Chabelco Steel Chain is built to stand up under the toughest type of operating conditions to give you years of dependable service.



② **TAKE THIS MILL,** for example. With the application assistance of the Rex Man, rugged Rex Chabelco was installed to feed logs into the mill. It's all in the day's work for Chabelco to have whole sling loads of logs dropped on the chain as shown here. And it will keep right on working through years of economical service. There'll be no production hold-ups here due to premature chain failures.



③ **AS SHOWN** in this close-up, each part of Rex Chabelco is built to exacting specifications. The straight side bar type shown here is the ideal chain for extra heavy-duty conveyor work. Offset side bar types are used for normal heavy-duty conveyors and drives. They maintain accurate pitch, assuring correct alignment of attachments throughout their operating life. The Rex Man will be glad to assist you in the application of Chabelco for your mills. Ask him also about Baldwin-Rex Roller Chain for your high speed drives. Write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.

REX CHAIN BELTS

CHAIN BELT COMPANY of Milwaukee

BILL, WITH ME - - -

SHEET-TO-SHEET UNIFORMITY IS MORE IMPORTANT THAN SKID-TO-SKID UNIFORMITY!

—And this is one of the many superior qualities you find in paperboard surface that is sized with Kelgin*, the algin surface sizing agent. It insures uniform ink absorption, full high gloss ink printing control, provides consistently uniform results.

Kelgin is a product of nature that has been rigidly processed, is free of impurities and easy to use. It is soluble in both hot and cold water and adaptable to water box or size press application. With Kelgin, you find no foaming, picking or sticking to the rolls. It additionally reduces the tendency of sheets to curl.

This modern surface sizing agent is highly economical. For full information on the adaptation of Kelgin to your particular application, just drop us a line.

KELCO COMPANY

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20 N. Wacker Drive
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LOS ANGELES—14

Cable Address: KELCOALGIN—New York

Thanks for your vote of confidence

Thanks to the well justified confidence of old customers and new, Moore & White is now busy as a beaver with orders for complete paper-making assemblies. Orders for units designed to do a specific job in the paper-making process. Orders for parts.

Like Rome, the mammoth, complete, soup-to-nuts jobs are not built in a day. They take months, and tie up a lion's share of plant-capacity. But orders for more of them are still welcome.

Component units are quite another matter. For example, we are able to make prompt delivery of the famous Moore & White Cutters, Winders, Re-winders, and Lay-boys, all of which have been newly designed to improve performance. Trials have verified our engineers' fondest predictions concerning them.

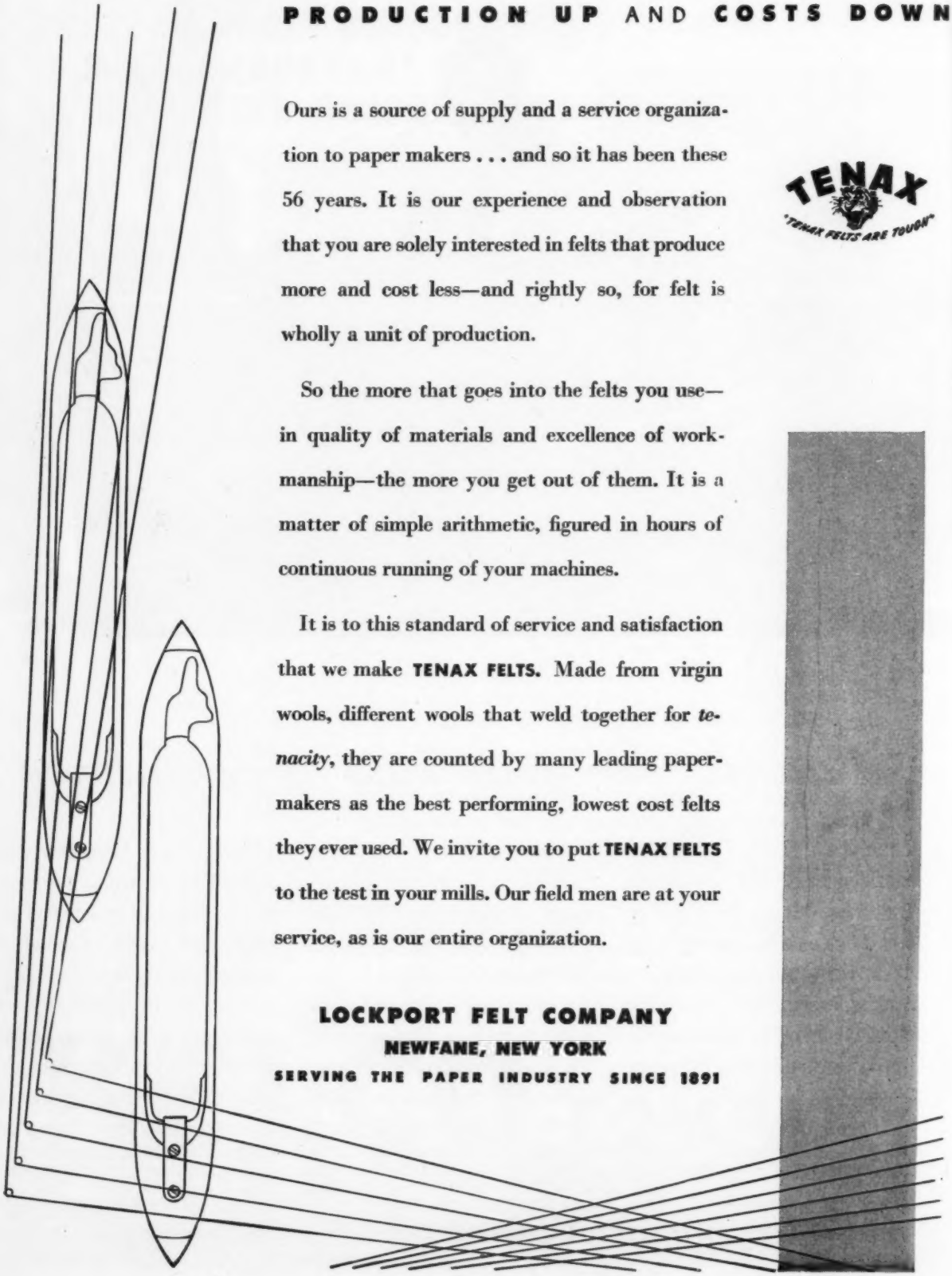
Yes, we are pleasantly embarrassed with business. But we'll do everything humanly possible to deliver to you the paper-making equipment you need, when you need it.

The MOORE & WHITE Company 15TH STREET AND LEHIGH AVENUE • PHILADELPHIA 32, PA.

CUSTOM-BUILT MACHINES FOR PAPER MAKERS

TENAX FELTS ARE MADE TO HELP YOU KEEP

PRODUCTION UP AND COSTS DOWN



Ours is a source of supply and a service organization to paper makers . . . and so it has been these 56 years. It is our experience and observation that you are solely interested in felts that produce more and cost less—and rightly so, for felt is wholly a unit of production.

TENAX
"TENAX FELTS ARE TOUGH"

So the more that goes into the felts you use—in quality of materials and excellence of workmanship—the more you get out of them. It is a matter of simple arithmetic, figured in hours of continuous running of your machines.

It is to this standard of service and satisfaction that we make **TENAX FELTS.** Made from virgin wools, different wools that weld together for *tenacity*, they are counted by many leading papermakers as the best performing, lowest cost felts they ever used. We invite you to put **TENAX FELTS** to the test in your mills. Our field men are at your service, as is our entire organization.

LOCKPORT FELT COMPANY
NEWFANE, NEW YORK
SERVING THE PAPER INDUSTRY SINCE 1891

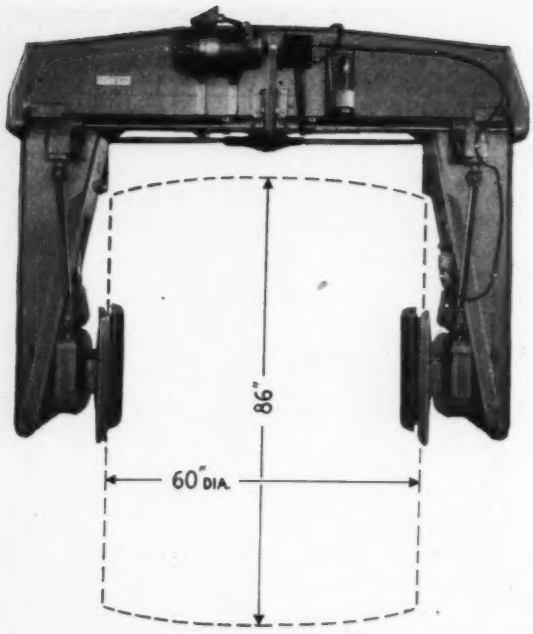
NEWS

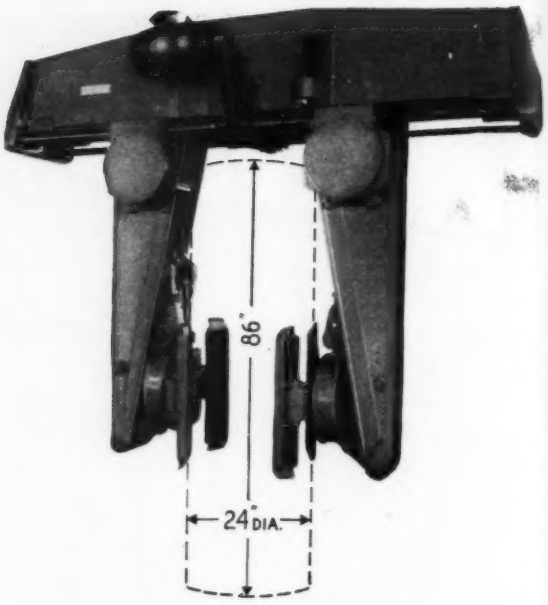
A. O. SMITH Corporation

FIELD SALES MANAGERS VISIT NEW VESSEL HEADQUARTERS. Warren Hendrickson, New York; Bill Jackel, Chicago; Georges Pateneaux, International; and Tabe Mahler, Los Angeles, get a personal tour of the newest building on the A. O. Smith property in Milwaukee, guided by Henry Needham, Vessel Division Manager.

TWINS THAT AREN'T TWINS! A. O. Smith metallurgical engineers discovered that successive heats of the same alloy react differently in service to corrosion. Then they figured out how to determine before fabrication that a particular heat would resist corrosion satisfactorily.

REMEMBER JONAH AND THE WHALE? A. H. Zastrow (left), traffic manager for A. O. Smith, starts on a complex trip by rail and water with one of the largest shop-fabricated vessels ever built. 16 feet diameter and 106 feet long, this oil-refining vessel weighs over 320,000 lbs.





LARGE OR SMALL *ROLLS*

THIS GRAB HANDLES THEM ALL

Cleveland Tramrail Crane with Roll Grab controlled completely by operator in cab. No floor attendants needed.

Cleveland Tramrail Systems with motorized roll grab handle all size rolls up to 6000 lbs. Stock of all types from light crepe, tissue and felt, to kraft and hard box-board are held firmly without telescoping. Motorized mechanism turns rolls to horizontal or vertical position.

This equipment speeds handling, reduces paper spoilage and greatly increases capacity of a storage room. Many installations are providing large savings. Let us tell you about them.

GET THE FACTS

Booklet No. 2012 gives authentic facts and figures. Send for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

What is the best way to control a dryer section?

Because of its importance in determining the finish of the final product, drying is recognized as one of the most critical phases of paper manufacture.

Brown engineers have made extensive studies of many methods of dryer control and the results produced by each one. On the basis of these studies, it can be said that there is no *best* way to control a dryer section. However, standards were set up which determine the best control system for a given group of plant conditions.

The five systems shown at the right are all based on control through the medium of temperature—employing either thermometer or ElectroniK controllers. (Other Brown Systems employ steam flow or pressure as the controlling medium.) By studying the quality, nature and capacity of the steam supply, and the design of the dryer section, Brown engineers can recommend the best system for your mill requirements.

If you are seeking better temperature control of your present or proposed dryers, this "know-how" of Brown engineers can help you. Write or telephone your local Brown Office.

THE BROWN INSTRUMENT CO., 4489 WAYNE AVE., PHILADELPHIA 44, PA.

DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

SUBSIDIARY COMPANIES IN TORONTO • MEXICO CITY • LONDON • STOCKHOLM
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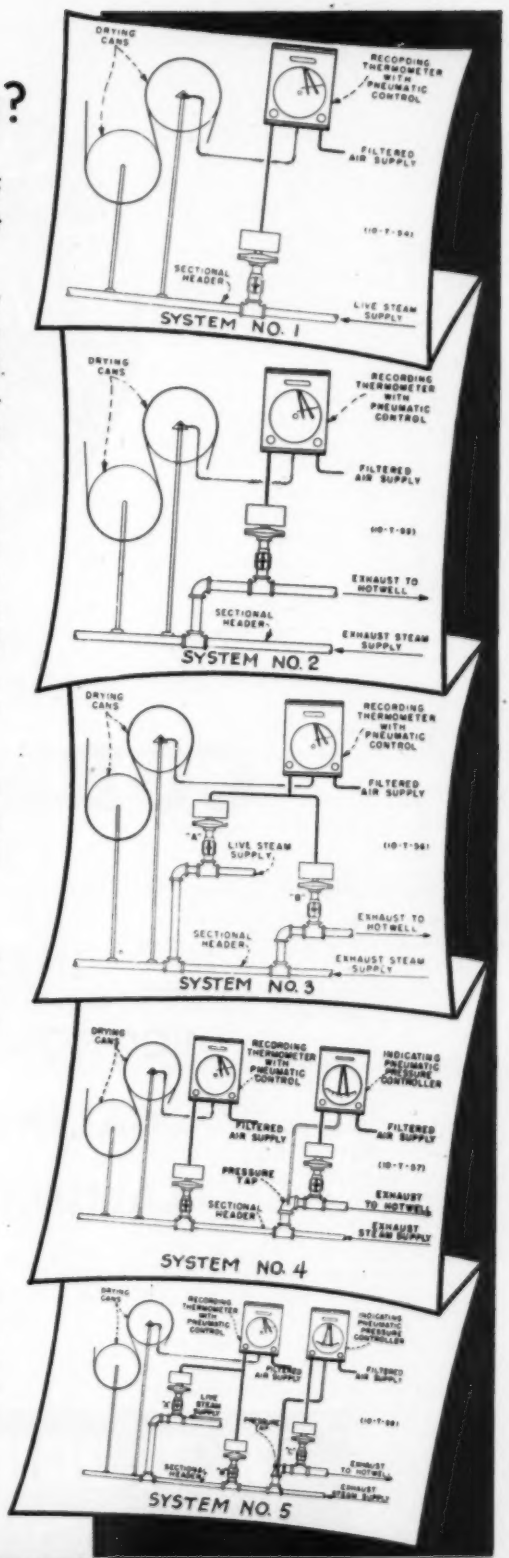
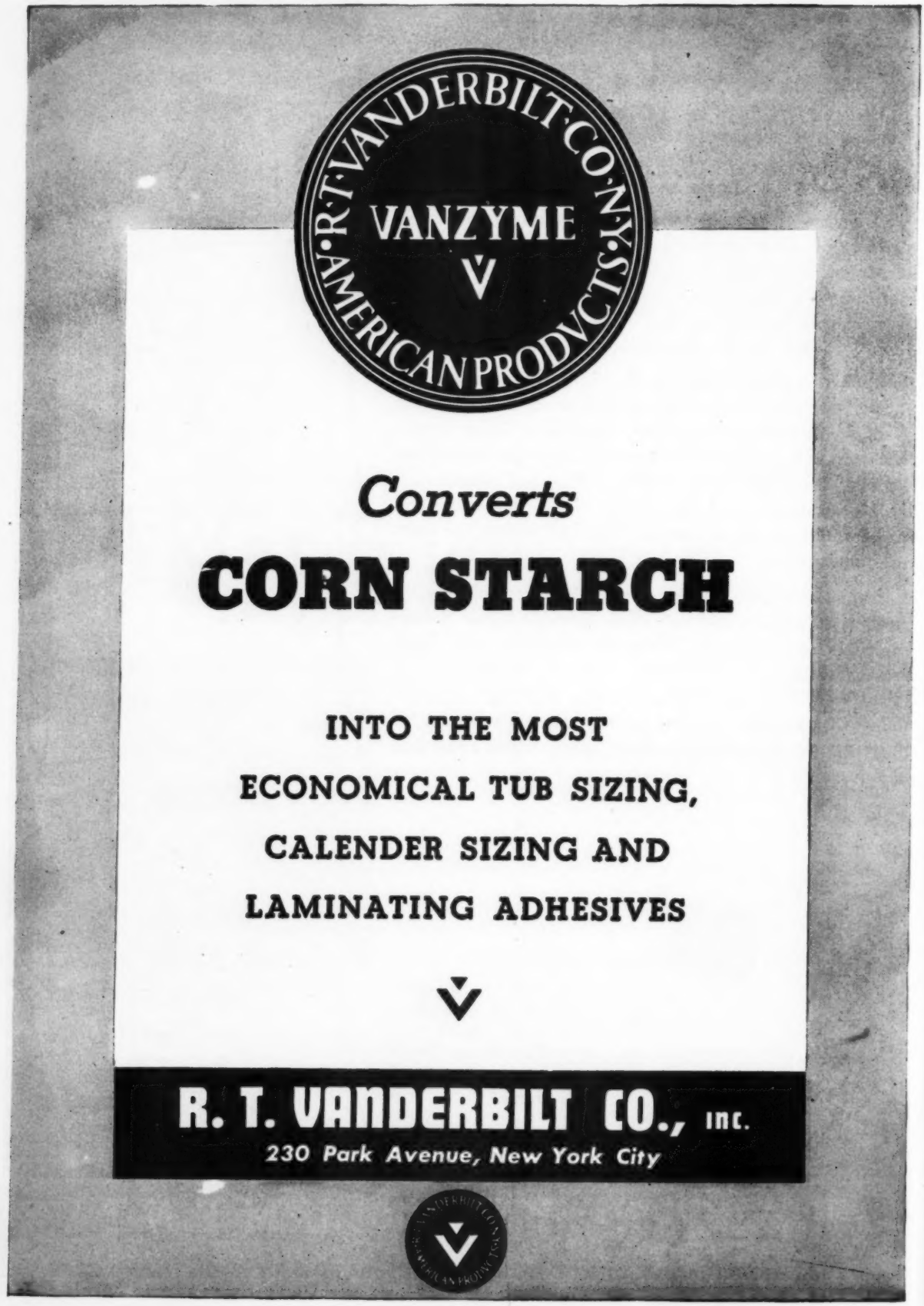
Send for your copy of Data File No. 2.9-10 which describes Brown Dryer Section Control Systems.



BROWN INSTRUMENTS

AND MINNEAPOLIS-HONEYWELL CONTROL SYSTEMS

For Temperatures . . . . . Pressures . . . . . Flows . . . . . Liquid Levels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VANZYME
AMERICAN PRODUCTS
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CORN STARCH
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R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

"Would Be Rich?—Use Wood Waste"

▶▶▶ IT HAS TAKEN a long time and two catastrophic World Wars to bring about a world-wide shortage of paper products, the most essential commodity of modern commerce and industry. We never believed it could happen to us. We were lulled into a sense of false security by the inherited assurance that we, here in America, had wood in perpetuity. But, alas, we are obliged to admit, reluctantly, that our inheritance has been dissipated.

During the past few years those detectives of our economy, the researchers, have ferreted out the indubitable fact that there is a world-wide shortage of wood pulp.

Wood pulp is the basic raw material from which most all paper products are made. Without an adequate, constant supply of pulpwood there is no surety of a continued adequate supply of wood pulp.

That there is a world-wide shortage of wood pulp, you have but to scan the current issues of the public press and national magazines for corroboration. For instance, read the illuminating article captioned "World Shortage of Pulp" in October issue of *Fortune* and get wise to the basic facts.

Now that we are agreed paper products are short and there remains no further grounds for discussion or argument of that point, isn't the next question, "What are we going to do about it?" in order? It is easy to spot errors after they have been made, but it is a hard thing to find the right remedies and to see that they are adopted.

The reason we, in this country, are facing this lamentable situation is that for over seventy years we have wasted our forest resources. If we continue the present policy of overcutting our depleted forest stands and converting so much of the timber into lumber, we shall be continuing the most wasteful agency responsible primarily for the exhaustion of our forests.

Seventy years ago, for instance, we had coniferous forests in the state of Wisconsin sufficient to cover our wood working industries in perpetuity. Today, Wisconsin can furnish but a scant 25 per cent of the timber required for its own needs. Wasteful lumbering is largely responsible for the change.

It is estimated by technical authority, the Forest Service and industrial operators in lumbering, that only one-fourth to two-thirds of the tree is recovered in useful lumber. The balance —67 to 75 per cent—is wasted. In 1937, the last available world wide statistics showed that of the 100 per cent world cut of timber, 15 per cent was recovered for usable purposes, 85 per cent was wasted. In the same year, the United States recovered 28 per cent for usable purposes and 72 per cent was waste. In Germany that year 64 per cent of the timber cut was usable and 36 per cent waste.

Therefore, the obvious obligation resting upon us is to convert our 72 per cent waste into wealth. Certainly if Germany could better us by 100 per cent we can at least measure up to their pattern.

Of course, we have timber enough in this country, if we eliminate our waste, to assure our modern wood users an abundant supply for all purposes, without shortages. But what must be done is to change our timber conversion methods. Let more of the wood be converted through digesters and other modern plywood techniques, instead of by saw mill processing.

Worth of an Idea

▶▶▶ IDEAS ARE FOOD for the mind. They may be good or bad; they may make for great progress; or they may result in a cataclysm. Without them human progress would stand still.

Good ideas, if put to work, spell progress.

Reaumur's idea to use wood as a papermaking material has proved itself to be a good idea. It has made our present wood pulp and paper industry possible. Without it, no one can say if the industry would be existent today. Yet, now, we have groundwood pulp, sulphite pulp, soda pulp, sulphate pulp, semichemical pulp and other special pulps made from wood, as well as a paper industry in the United States which will produce in the neighborhood of 21,000,000 tons of paper and paperboard this year.

The idea of Reaumur came from his observations of wasps at work. He laid it before the French Royal Academy in a treatise dated November 15, 1719. In part, according to Dard Hunter in his monumental work, *Papermaking Through Eighteen Centuries*, Reaumur wrote, "The American wasps form very fine paper, like ours; they extract the fibers of common wood of the countries where they live. They teach us that paper can be made from the fibers of plants without the use of rags and linen, and seem to invite us to try whether we cannot make fine and good paper from the use of certain woods. If we had woods similar to those used by the American wasps for their paper, we could make the whitest paper, for this material is very white. By a further beating and breaking of the fibers which the wasps make and using the thin paste which comes from them, a very fine paper may be composed. This study should not be neglected, for it is, I daresay, important."

The idea did not take root immediately. Rather, as recent as 1887, James Dunbar in the third edition of his book *The Practical Papermaker: A Complete Guide to the Manufacture of Paper*, stated: "Wood pulp is a papermaking material which has not found much favour with the paper maker or the printer—the former complaining of its brittleness and the difficulty of retaining its surface for any length of time, the latter from the injury it does the printing plant. It may be suitable as an admixture with other materials for common cheap papers, but it certainly is not for fine papers . . ."

It would have been so easy to let Reaumur's idea remain dormant; but one of man's great assets is his discontent. The world needed more paper and cheaper paper with the result that the idea just shoved a number of people around—Keller, Watt and Burgess, Tilghmann, Ekman, Mitscherlich, Ritter and Kellner, Dahl, and many others—with the result that our modern industry has developed.

Learning from the Other Guy

WILLIAM SIBLEY

▶▶▶ THE FINDINGS OF a very interesting survey recently conducted in the metal working industry by *The Iron Age* are summarized in the September 11 issue of that periodical. Some 2,000 plants (machine tool *users*, NOT machine tool makers) rated at a minimum of $200,000 were quizzed with a series of eighteen questions. Five hundred sixty replies were received, these representing an excellent cross-section of the metals trade industry, which of itself, is responsible for forty-six per cent of all manufacturing. Since many of those questions touched upon problems common to all industry, it is both interesting and profitable to examine the replies. Just as the metal trades industry could learn much from the pulp and paper industry, so may we gain by studying cross-section thought of 560 machine tool users. Not all questions, of course, are of interest to an extraneous industry such as ours, but on those which answer problems such as rising material and labor costs (also faced by our industry), the replies are frequently illuminating and gratifying.

One of the questions asked was: "Would you consider the purchase of more-productive new machines for replacing otherwise serviceable machines?" Of the 560 companies which answered this question, 488 said "Yes," with only 72 replying "No." This means that 87 per cent of the companies would consider replacing machines when they become less efficient than newer machines even though the old ones are still serviceable and have not been completely written off.

Among the 13 per cent, some said "No" qualifying their reply by remarking that frequently the desire for new and better machinery is modified by the cash position of the company at the time of need. Here is the great American doctrine of mass production at work with a vengeance. If something else can do our work better, faster, cheaper, safer—the dickens with what we have now (regardless of how good we thought it was)—let's have the new that is better, faster, cheaper, safer. Messrs. Bevin and Atlee might well read that doctrine into the English and Welsh coal industries where the crying need for mechanization is holding up an entire nation.

A second question along this line of thought was: "If you would replace existing machines before they are actually worn out, how much saving in per cent of cost of new machines would you have to be shown to induce their purchase?" Fifty were content with 10 per cent a year; 30 companies wanted 15 per cent in one year; 136 companies—20 per cent; 122 companies—25 per cent; 128 companies—33 per cent; 72 companies—50 per cent and 22 companies demanded 100 per cent in one year. But here are 69 per cent of all companies expecting only from 20 to 33 per cent saving in one year. Many of these answers were tempered, however, by the manner in which they expected savings to accrue —whether they figured them in direct hour savings only; savings in both labor and material; savings in labor and applicable factory burden; new machine cost minus salvage of old, divided by 3; savings in direct labor cost plus 150 per cent overhead rate; etc., etc.

Another interesting question was: "Would a higher rate of machine-cost write-off be a good thing for your company in helping you make more money, reduce the price of your product, improve the physical condition of your plant, etc?" With almost three-fourths of the 512 companies that answered this question favoring a "write-off" of more than 6 per cent per year on machines, *Iron Age* points out it seems strange that a higher write-off has not become standard practice long ago. In the days before the war, when income taxes were much lower, the 6 per cent write-off was common practice, with the result that it isn't entirely the fault of the Internal Revenue Department that present income tax regulations impose barriers to the indiscriminate adoption of higher write-off rates. Certainly there is decided inconsistency here, and in the answers to the question of "how quickly do you expect a new machine to pay for itself?" There, the shortest period was 10 years, while some few manufacturers wanted the new machine to pay for itself in a single year. . . . Yet they write off their equipment at the rate of 6 or 7 per cent per year. It just doesn't add up, and something should be done about it, both with the companies owning the machines and the Internal Revenue Department.

Yet another question which proves interesting and gratifying in the matter of response is this one: "Do your employees oppose the installation of new machines which reduce manpower requirements or which replace manually-operated machines with automatic ones?" Of the 560 reporting, 506 said that there was no opposition on the part of the employees; with 54 companies stating that there was "some opposition." Shades of the early thirties, when tons of ink was spilled over the controversial subject of "technocracy" and how far machines could go in replacing human labor! But that was because the early thirties saw a huge amount of unemployment, a period in which employee opposition to new machines usually is most serious. Ordinarily, the workers enjoy and prefer to work with new machines, and where such machines are faster in production piece-work rates usually can be compromised satisfactorily. It is further gratifying to learn that of the 54 companies that reported some opposition by employees, only six companies said such opposition was strong enough to deter them from making such purchases and installations anyway. Some day it will be more fully understood (yes, even in depression days) that there is no such thing as labor-saving machinery—only labor-aiding machinery.

When asked "How much War Assets surplus machinery have you purchased this year, and why?"—438 out of 560 companies admitted buying over $92,000,000 worth of machines but while 248 of them bought because of lower price, 310 of the companies bought because of *availability*. (52 companies said the machines were already in their plants.) Here again the American insistence upon quality rather than price pops into the lime-light. I suppose we shall always have with us the $2.98-minded housewife, but when it comes to the serious business of running plants, mills and factories, reducing spoilage, rework and rejects, effecting safer practices, speeding production and at the same time lowering costs, it is a matter of "what-will-it-do-for-me-and-when-can-I-get-it" — not: "how-much-does-it-cost."

It has been this sort of thinking that has put America in the forefront of all other nations—and will keep it there, if we don't sell it short.

for dependable low-cost service . . . . Use LINK-BELT Chains and Sprockets

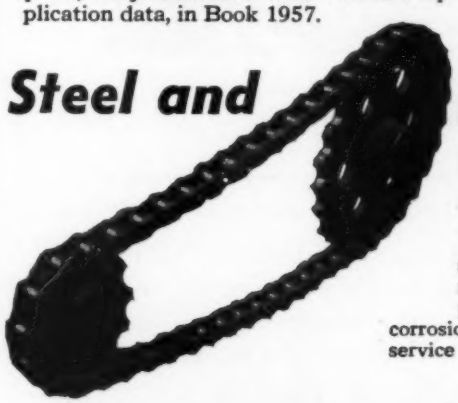
Silent Chain Drive

The ultimate in high-speed drives, Link-Belt Silverstreak silent chain combines long-life, highest efficiency and lowest over-all cost. It runs slack on short centers, with least bearing pressure, yet slip is impossible. Unaffected by temperature, oil or moisture; can not deteriorate during idle periods. Data Book 125 is packed with helpful facts and application suggestions—Send for your copy.

Roller Chain Drive . . .

Link-Belt Silverlink roller chain is applicable to the widest range of power transmission problems. Great Strength in relation to weight, stamina to withstand shock loads, smooth, positive and flexible operation are outstanding advantages of this versatile medium. Motion in either direction, without slip or creep, can be given any number of shafts. Single or multiple widths, from ⅜ inch to 2 inch pitch, fully described with valuable application data, in Book 1957.

Steel and Malleable Chain Drives



Supply the mechanical advantages of chain power transmission to heaviest-duty, slow and medium speed applications. Link-Belt steel, malleable iron and Promal chains provide the strength, stamina and corrosion resistance to meet the severest service conditions. Send for Book 1994.

Most Complete Line of Power Transmission Machinery

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A Link-Belt power transmission engineer has no one's ax to grind—except his customer's. Not confined by a limited line—he can recommend the type of speed reducer—the type of bearing—the type of chain drive—the exact power transmission units best suited to his customer's needs. Link-Belt engineering advice on your power transmission problems is completely unbiased. There is no reason for it to be otherwise.

THE SYMBOL OF QUALITY · LINK-BELT ·

LINK-BELT

Power Transmission Machinery

Typical scene in magazine editorial office of the 1850's

Magazines for the Millions

America's first magazine was published in 1741. During the next century many were started, but only one, *Godey's Lady's Book*, attained a circulation of as much as 150,000.

Not until the discovery of the wood pulp process made paper plentiful did magazines bring to largely increasing numbers what Dr. James G. Holland, an early editor of *Scribner's*, called "the intellectual food of the people."

Today more than 700 magazines with a total circulation of more than 110 million copies carry culture and entertainment to the home, and their advertising pages stimulate low cost distribution of a huge volume of consumer goods. Thus magazines, made possible by plentiful paper, have helped to make the United States the best informed of all nations, with the highest standard of living in the world.

The dramatic story of paper is told in the sound-and-color film, "Paper — Pacemaker of Progress," and in a book under the same title. Both are presented by F. C. Huyck & Sons as a tribute to the Paper Industry. The book will be sent free upon request.

F. C. HUYCK & SONS • *Kenwood Mills* • ALBANY, NEW YORK

KENWOOD WOOL PRODUCTS

HUYCK *Felts*

NO WONDER SHE DIDN'T KNOW WHAT TO DO!

Unlike the "Old Woman Who Lived in a Shoe," you certainly should know

what to do—especially when it comes to steamfits.

We know of certain mills with as many kinds of steamfits on their dryers as that old lady had children—and no two alike.

How much better to standardize on just one kind—the Miami No. 72 steamfit—the only steamfit built that:

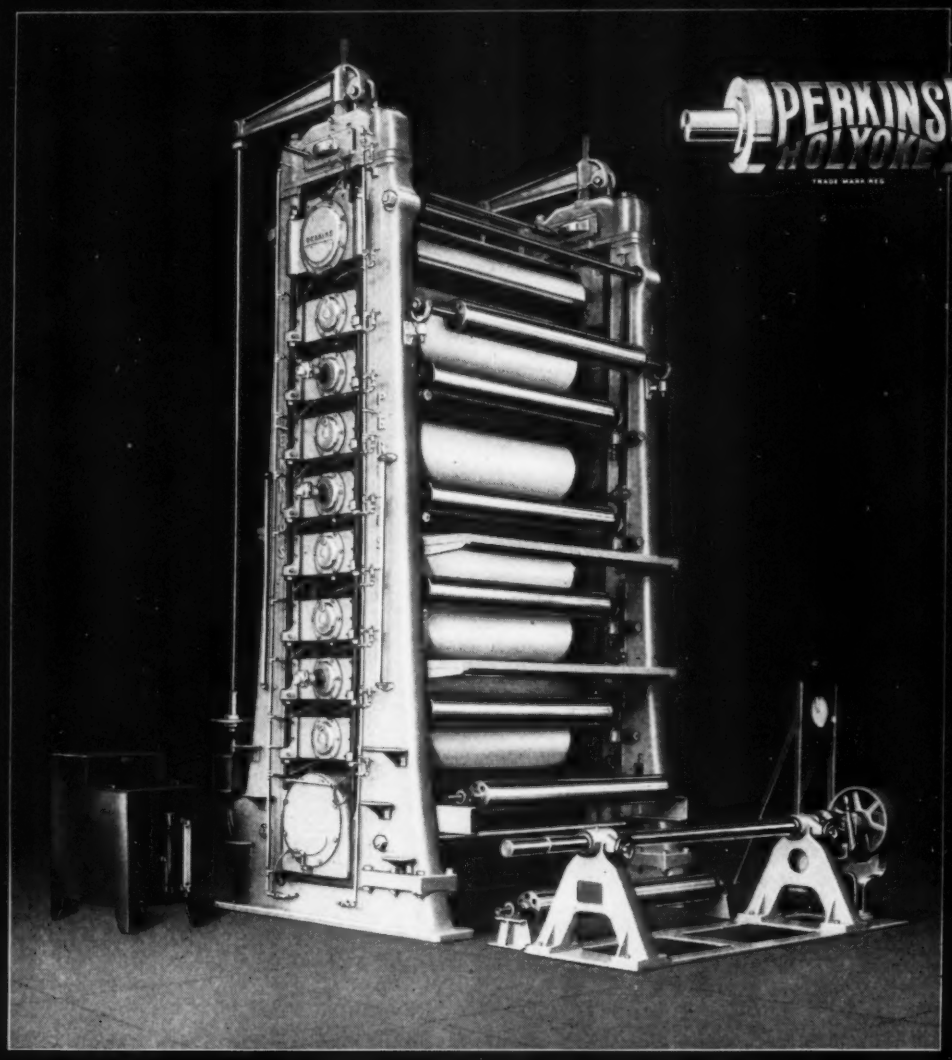
DOESN'T LEAK—DOESN'T SQUEAK! DOESN'T REQUIRE OIL! CANNOT GUM UP!

That's right. These No. 72 steamfits have Z-7 sealing rings—your assurance that they'll give satisfaction.

How about a few to prove the claim and start you out on a steamfit standardizing program?

Dilts **SHARTLE BROS. MACHINE CO.**
MIDDLETOWN, OHIO

DILTS MACHINE WORKS, FULTON, N.Y. • DIVS. OF THE BLACK-CLAWSON CO., HAMILTON, OHIO • ASSOCIATE: ALEXANDER FLECK LIMITED, OTTAWA, CAN.



PERKINS ten-roll 74" Web Supercalender. All rolls in Timken anti-friction bearings. Forced feed oil lubrication to all bearings, with oil pumps. Foxboro air-pressure system. Motor lift for separating rolls. PERKINS CALENDERS are noted throughout the industry for remarkable endurance. . . . They are running steadily, even under the most severe operating conditions, with utmost in power economy.

B. F. PERKINS & SON, Inc.

HOLYOKE, MASS., U.S.A.

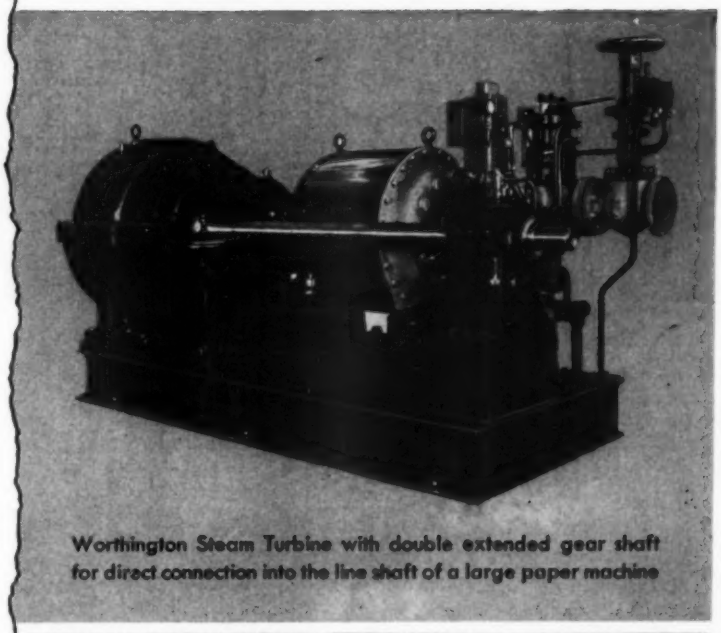
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

ELIMINATE SPEED FLUCTUATIONS

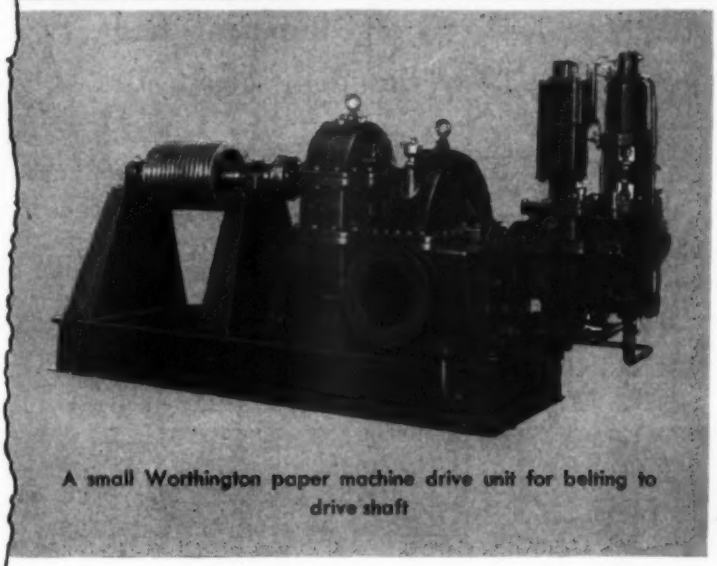
with Worthington Paper Machine Drives

Continuous steady speed operation invariably follows when Worthington Steam Turbines take over the driving job The isochronous governor assures no change in operating speed from minimum to maximum load for any given control setting A special single-seated governor valve or valves give stable operation at low loads. In addition, the governor is adjustable over complete range to accommodate any paper machine requirement — remote speed controls can be provided if desired. Turbine-driven auxiliary oil pump protects against shutdown from power failures.

Whether your conditions call for automatic or hand nozzle control, direct connection or belted to line shaft, you can depend on Worthington to manufacture a smooth-running, economical steam turbine for any size of paper or board machine. Call your nearest Worthington office for more information proving that — in steam turbines as in so much other equipment — *there's more worth in Worthington*. *Worthington Pump and Machinery Corporation, Steam Turbine Division, Wellsville, New York.*



Worthington Steam Turbine with double extended gear shaft for direct connection into the line shaft of a large paper machine

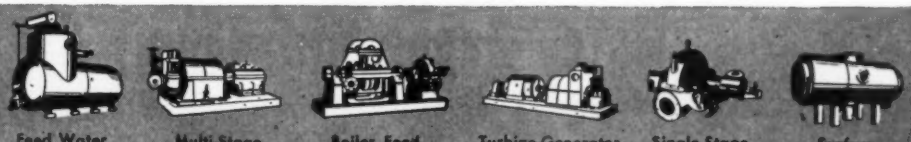


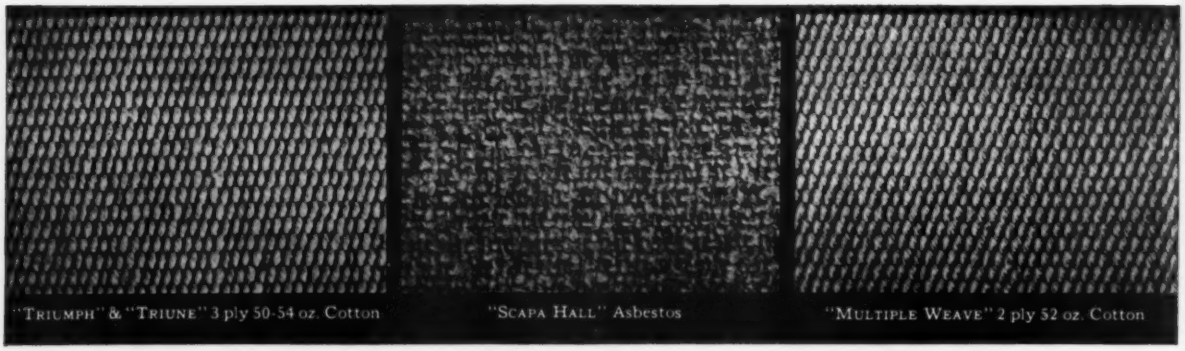
A small Worthington paper machine drive unit for belting to drive shaft

WORTHINGTON

T7-4

A GREAT TEAM IN STEAM





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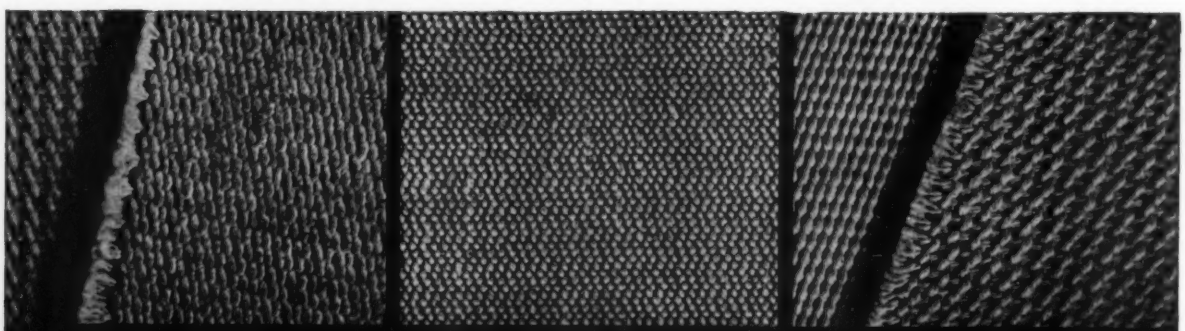

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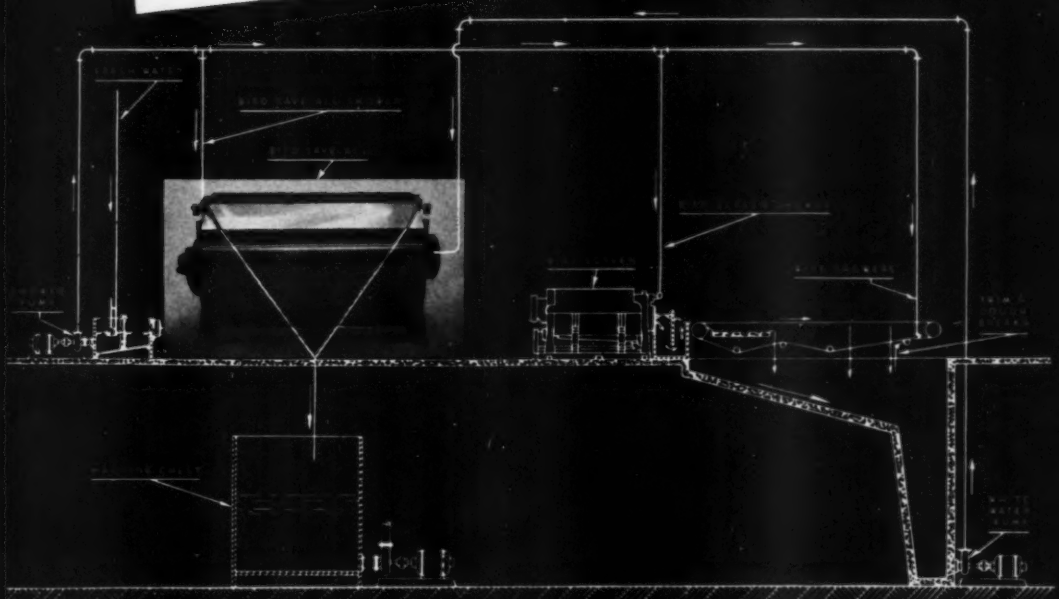

Now is the time when a simple, practical system like this is worth its weight in gold. It quickly pays for itself in fibre and water savings and it effects substantial operating savings as well. There's no piling up of broke when starting up, and no shutting down to change the deckle. All the wet stock as well as white water is simply run through the Bird Save-All. Water can be closely controlled and reused, too.

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New Plant Selects Water-Lubricated Ryertex Bearings for Unique Barker

7-foot giants, 26 feet long or 3-inch diameter toothpicks, 8 feet long—logs from one extreme to the other are all the same to the new hydraulic barking machine at the Puget Sound Pulp & Timber Co. plant. It handles them all with ease. Rotates the log while powerful jets of water clean away the bark.

Designed by the engineering staff of Puget Sound Pulp & Timber Co. and built by Sumner Iron Works, this latest in hydraulic barkers demands the best in bearing equipment. That's why Ryertex bearings support the shaft that turns the toothed rotating wheels shown above.

Ryertex bearings are more efficient here because they're water lubricated. Adequate lubrication for bearings requiring oil or grease would be difficult to maintain in the presence of so much water. Then too, the low friction coefficient of Ryertex keeps power requirements low. And low friction means long bearing life—less servicing of a difficult installation.

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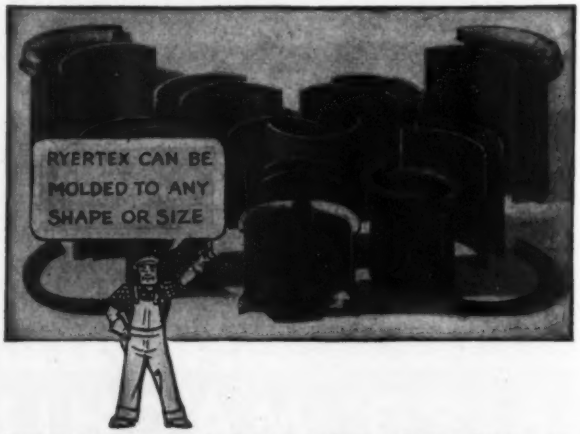
Ryertex performance adds up to greater efficiency in wood preparation just as it does in every other paper-making process. A Ryertex engineer will gladly consult with you on any bearing problem. Call, wire or write—

Joseph T. Ryerson & Son, Inc., Ryertex Division: Los Angeles, Chicago, New York.



Ryertex applications include: Bearings for Barkers, Beaters, Grinders, Jordans, Refiners, Fourdriniers, Press Rolls, Calenders, etc., also Suction Box Covers, Pipe Covers and Forming Boards.

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THE PAPER INDUSTRY
and PAPER WORLD
OCTOBER 1947

Loft Drying of Paper. (From "Notes of the Manufacture of Hand-Made Paper," by Barcham Green, Hayle Mill, Maidstone, England, 1936)

Air-Drying of Fine Papers

J. H. MILLER
Vice President & General Mgr.
Whiting-Plover Paper Company

▶▶▶ AIR-DRYING of paper is as old as the art of papermaking. The first papermakers, the Chinese, dried their paper much in the same manner as clothes are dried on a line. However, most of the paper made today is dried entirely on the paper machine. Such papers are called "machine dried." There may or may not be a tub incorporated in the paper machine. If so, it usually follows a number of cylinder dryers, internally heated with steam, and after passing through the tub, containing a starch-gum solution, the paper is given its final drying over an additional number of cylinder dryers.

The distinction between machine dried and air-dried papers is well defined in the specification of the Government Printing Office, as follows:

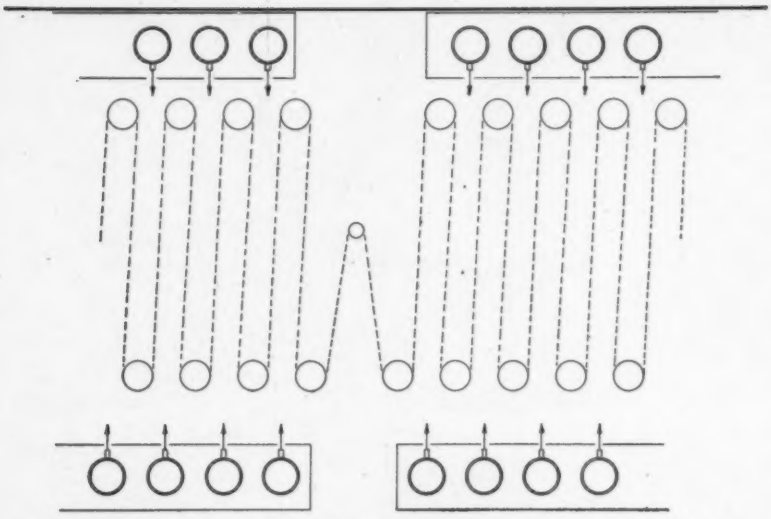
The term "air-dried" shall be construed to mean that the paper, after passing through the sizing tub, has been dried without contact with internally heated dryers.

There is one form of air drying, formerly in considerable vogue in the drying of tub-sized papers, which we will consider only briefly, and that is loft-drying. Only a small part of the total of tub-sized papers are now dried by this method, in which the sized papers are cut off in sheets after being sized in a tub, equipped with a pair of press rolls. After a stack of paper is accumulated on a truck or skid, it is hauled to the loft. This is simply a large room, heated with steam coils or radiators; sometimes ventilating fans are used to increase air circulation. The wet-sized paper is hung by hand on wooden poles, in lifts of from ten to thirty sheets, depending on the weight. The paper is left on these poles until it is judged to be sufficiently dry. The time required may range from several hours to a week or more, according to atmospheric conditions. The term pole-dried refers, of course, to paper dried by this method.

Loft or pole-dried papers usually have very good physical properties, but there are also a number of adverse factors. Some of these are high cost of handling, the long time required, and the pole marks, running down the center of each sheet, due to the impression of the pole. This mark is especially difficult to cope with on the offset press, however it may be at least partially eliminated by sheet calendering or plating.

Another method of air-drying is that called the festoon system, which was used mostly in drying coated papers. In this method poles or sticks are also employed, but they are carried on chain conveyors, and the sized paper is dried in a continuous web being looped over the poles, spaced at regular intervals, in festoons from 4 to 8 feet in length. One disadvantage of this method is that on sized papers, it also produces pole marks, although the writer, about 16 years ago, patented a method of vibrating or partially rotating the poles alternately in both directions, which operated very successfully. However, there is still another objection in the drying of sized papers; due to the lack of tension it is difficult to secure control necessary to secure required types of finish.

Another type of air-dryer is called



Sectionalized arrangement of Barber Dryer with air supply nozzles. (Courtesy J. O. Ross Engineering Corp.)

the spar or English dryer, which is comprised of a series of skeleton drums. The two heads of each dryer drum are connected by a number of wood spars or slats, spaced several inches apart. Air is circulated within the skeleton dryers either by blowing it from hollow shafts or with fans. One objection to this type of dryer is the fact that occasionally the paper may be marked by the slats. However this difficulty may be largely, perhaps entirely, overcome by various means such as covering the slats, etc.

We now come to the roll or tension type of air-dryer. There are many different designs, some passing the paper, carried by rolls, horizontally back and forth, through the dryer, from top to bottom, or vice versa. In another type, the paper is passed over rolls arranged vertically. The best known is the Barber type, named for the inventor, a paper mill superintendent in New England, who first operated a dryer of this kind, about seventy years ago.

A more modern form, with electric drive, tension control, and recirculation of air has been developed by the Clark-Aiken Company, together with Reliance Electric & Engineering Company, and the J. O. Ross Engineering Corporation. As to details to this type of air-dryer, the one installed in the mill of the Whiting-Plover Paper Company, at Stevens Point (Wis.) in 1936 will be described here.

The wet or size end of our dryer is in close proximity to the dry end of our paper machines, and the reels from the machine are carried by an electric conveyor to the roll stand of the air-dryer. This roll stand holds two rolls, so that it is convenient to paste the beginning of the second roll to the tail-end of the first, when the first roll is nearly finished.

Following the roll stand is a preheating drum. This is equipped with a felt and also acts as a tension or draw drum to insure even feeding to the size press. The size tub is equipped with an adjustable dip roll, so that the depth of dip may be regulated.

The paper is passed beneath the dip roll and then through the size press, by passing the paper beneath the bottom roll, through the nip, and back around the top roll.

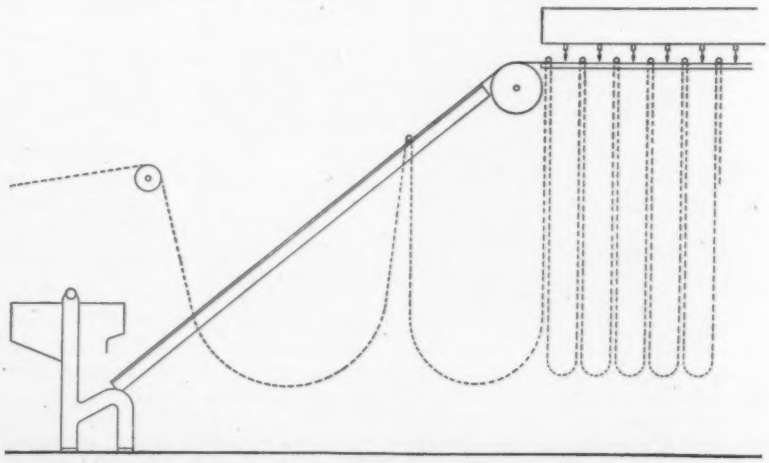
The bottom roll is rubber-covered, and the top roll may be of brass, bronze, or composition. We have found the latter to be the most satisfactory. At present we are using a Rubroc roll. The crown of the rubber-covered bottom roll is most important, and it is difficult to arrive at the correct crown as what is proper for a heavy weight of paper may not be so satisfactory for lighter weight. If there were such a thing as a roll with adjustable crown it would certainly be useful. Lacking this, we use a Foxboro Pneumatic Roll Loader, as we have found this device more satisfactory than the use of weights to vary the amount of pressure between the rolls. We also use a pressure recorder, showing the pressure or weight at each end of the roll. This also enables us to easily set the press for the pressure found most satisfactory for the particular weight and grade of paper being run.

After the press, the paper passes over a spread roll, or rather a pair of rolls meeting in the center, at a slight angle, which is adjustable. The purpose of this device is to eliminate wrinkling and the adjustment of this roll, both as to angle and distance from the press rolls is very important.

The paper next passes to the first section of carrying rolls, being threaded from a top roll to a bottom roll, back to another top roll, and so on. The first section differs from the following sections, (which in our dryer number six) in that only radiant, or infrared, heat is used. In the following sections heated air is employed.

Preceding each section is a dance roll. This is a counterweighted roll, usually of smaller diameter than the carrying rolls. It is free to move up and down in a slotted guide, and is so moved by the relative tension of the paper at that point. The movement of this dance roll actuates a rheostat, which controls the speed of the variable speed D. C. motor driving the section. Each section consists of 13 rolls—7 top and 6 bottom plus the dance roll.

All the rolls except the dance roll are driven through a sprocket on the end of each roll, by an endless chain,



Elevation sketch of festooner for air-drying of coated papers. (Courtesy J. O. Ross Engineering Corp.)

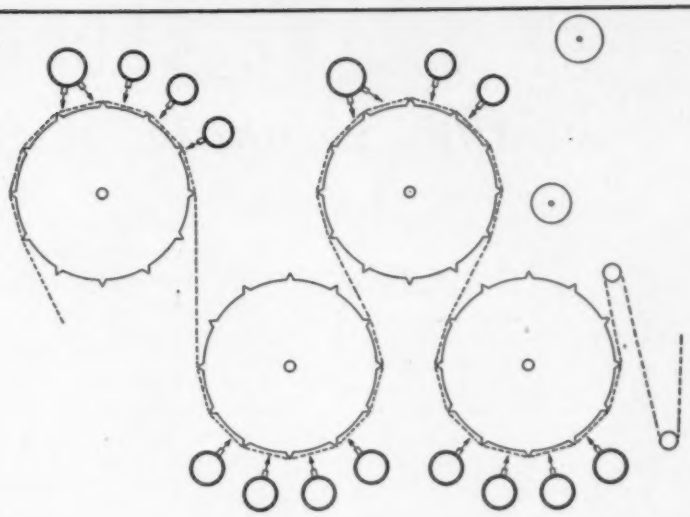
connecting all the rolls comprising a section.

Heated air is blown between the rolls, both from the top and from the bottom. The air is introduced from the outside, passes through a filter, and then into a heater and blower. The air is recirculated throughout the dryer in reverse flow. That is the air exhausted after passing through the last section, where the paper is dryest, is then drawn into the next heater and blower and then blown into the next to last section and so on. Therefore the dryest air meets the dryest paper, and the air which has picked up the most moisture is blown against the paper containing the most moisture.

After passing through the last section the paper passes around two or more draw drums, which are similar in appearance to paper machine dryers. They may be heated by steam if desired. Between the reels and the rewinder are placed the cooling rolls which are hollow, and cooled with water. Next the paper goes through the calender stack, or is passed over, as the finish may require. The paper is then wound on reels, and from them on a rewinder. The rolls are then put on a high speed full width cutter to be cut and slit into sheets. At the end of the air-dryer is located a moisture recorder, in our case a Verigraph, and the amount of moisture in the paper is controlled by the speed and by the temperature of the air used in drying.

The foregoing gives an idea of the principal steps in the tub sizing and air drying of paper, but the process is not quite as simple and easy as it may have been made to appear.

There are a great many variables, not only in the air-dryer, but on the paper machines, and in the beating operation, all affecting the air-drying process.



An English or slat dryer in elevation. Note skeleton drums and system of air supply. (Courtesy J. O. Ross Engineering Corp.)

On starting up our air-dryer, we immediately found it necessary to have much better control of freeness, beater pressure, jordan pressure, and consistency.

On the paper machines, we are obliged to insure a level sheet, of high uniformity in formation, density and bulk. Among other things, this means close attention to the condition of press rolls and calender rolls. There are also, of course, a great many variables in the operation of the air-dryer itself. In the size tub, for instance, the composition of the size, the consistency of the size, and its temperature, all introduce factors affecting the operation. In the lower grades of air-dried papers the usual sizing material is starch, modified by chlorination or by enzyme conversion. For the higher grades, either a combination of starch and hide glue, or all glue is ordinarily used, and each material must be handled differently than the others.

The regulation of the amount of drying to be done in each section is very important. If the initial drying is too severe, a skin drying occurs, which will most likely cause wrinkling, and result in excessive shrinkage. Sometimes rolls are skipped to overcome this difficulty, but only experience will enable an air-dryer to be operated with consistently satisfactory results.

In conclusion it seems fairly evident that to produce air-dried paper at speeds sufficiently high to be economical requires primarily the production of a good sheet on the paper machine.

The Role of Investment

Many companies devote substantial effort to the clarification of the character, function, and use of investment in modern business operations. They have found widespread misconceptions about the role of investments among employees, the community, and the general public.

These companies emphasize several basic types of facts which you may want to consider using in your own program:

1. Of the 130-odd million people in the United States, 71 million hold life insurance, 50 million are depositors in savings banks, and 20 million own shares of stock. In one way or another, these millions of people are investors in business enterprises.

2. Return on investment has been falling, for instance, if in 1939 a man had earned, saved and invested $33,000, his return would be $1,241. In 1946, the return on the same amount of capital would amount to $825—a decrease of 33 per cent.

3. It takes more investment money today to provide the foundation for an average job. The increased costs of doing business have been very substantial. (Since 1939 construction costs are up 90 per cent; price levels affecting inventories are up 92 per cent; the cost of equipment, general and auxiliary machinery is up 26 per cent; and basic wage rates are up 93 per cent.)

4. Few workers ever stop to consider how much investment money underlies the average job. The following table presents some facts which you may find useful . . . :

Net Capital per Wage Earner Employed (1939)

Chemicals	$26,090
Food	7,845
Leather	1,991
Lumber	3,058
Metal Products	6,491
Paper, Pulp	6,667
Printing & Publishing	6,122
Rubber Products	7,055
Stone, clay, glass	5,927
Textile	2,080

(Excerpted from "How to Tell Your Company's Story," published by The Research Institute of America, Inc., New York City.)

LIME RECOVERY
in the Sulphate Pulp Industry

W. H. TOCK, Engineer
Pyro-Processing Section
Allis-Chalmers Mfg. Co.

LIME SLUDGE, precipitated calcium carbonate, is produced in the conversion of sodium carbonate to sodium hydroxide in causticizing sulphate green liquor. In the older mills, lime sludge was a waste product originally; however, most mills today recover the lime for re-use as quicklime by reburning the lime sludge in rotary kilns.

In a few installations, in the early days of the industry, the multiple hearth furnace was applied for lime recovery. However, the high cost of maintenance and the low unit capacity soon led to the abandonment of the multiple hearth furnace as a lime recovery unit.

The rotary kiln has proved a natural process machine for sulphate pulp mill lime recovery. It was first used in this country about 1906; since then, it has been operated primarily for the production of cement and lime. The first rotary kiln used prior to 1920 for lime sludge reburning was, in all probability, an old small cement kiln.

Progressive improvements in the design of rotary kiln installations have resulted in efficient recovery units. This has been in keeping with the progress and growth of the sulphate pulp industry.

Care and consideration must be given to the selection of the rotary kiln and accessory equipment required to effect the recovery of lime from the precipitated calcium carbonate, otherwise known as lime sludge or "mud." The proper functioning of the equipment and its continuity of operation will determine the economy of lime recovery. Most pulp mills, except for the unforeseen, operate for periods up to six months, seven days per week, twenty-four hours per day before general shutdowns for overhaul and repair of equipment. Accordingly, all process and recovery equipment must be selected based on equal continuity of service, or costly chemical waste will occur.

The following chemical equations show some of the simpler chemical reactions but their progress is complicated by many factors in their application to the sulphate pulping process:

(*1*) *Slaking*

$$CaO + H_2O \rightarrow Ca(OH)_2$$

(*2*) *Causticizing*

$$Na_2CO_3 + Ca(OH)_2 \rightarrow 2NaOH + CaCO_3$$

(*3*) *Calcining*

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

The importance and position of the rotary kiln in the chemical recovery is indicated in the flowsheet shown in

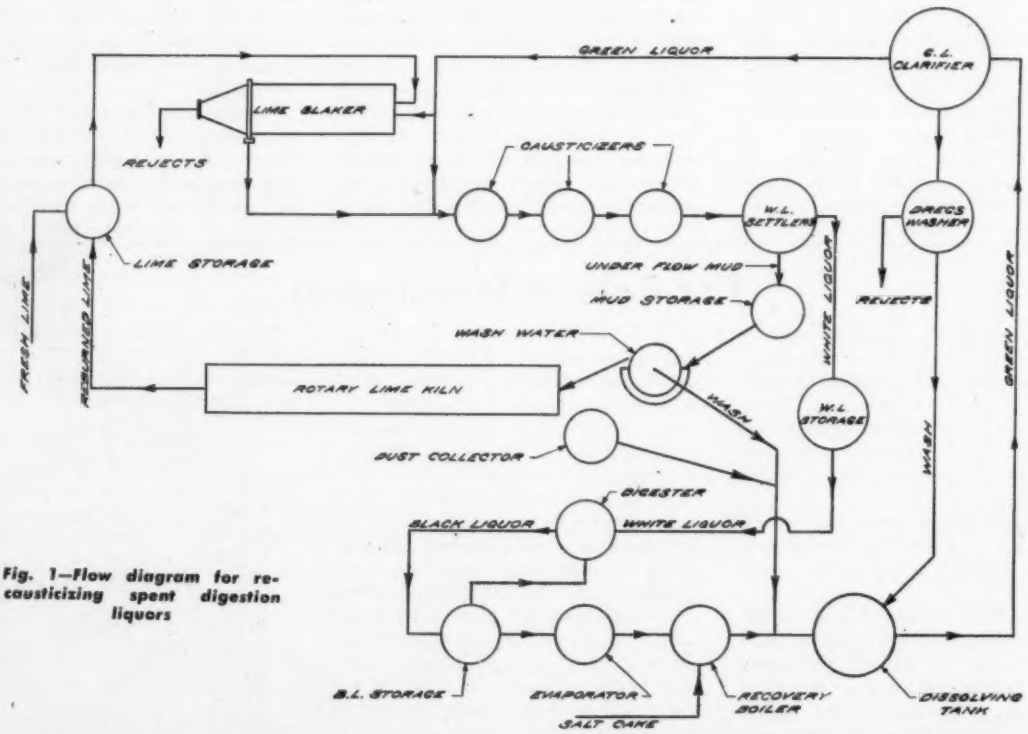
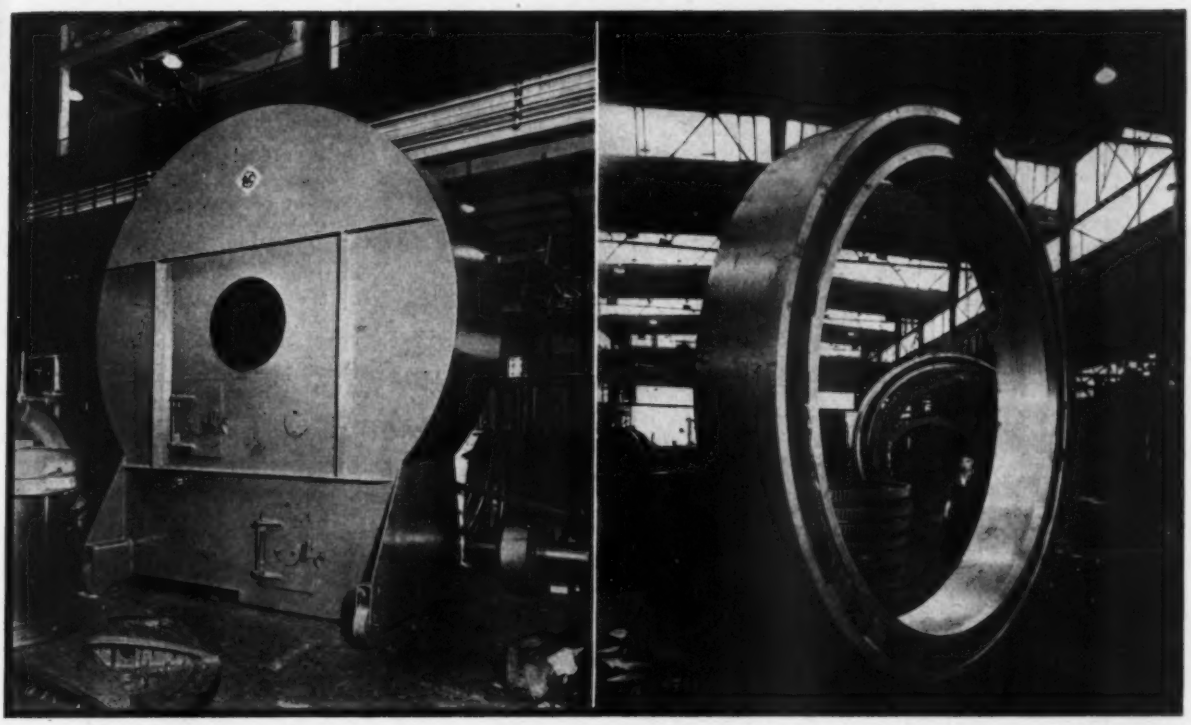


Fig. 1—Flow diagram for re-causticizing spent digestion liquors



LEFT—Kiln firing hood on wheels showing burner opening and access and inspection doors . . . RIGHT—Cast steel plain riding ring

Figure 1. In most sulphate pulp mills, in either batch or continuous causticizing systems, the lime mud settling from the white liquor is thoroughly washed with large quantities of water and again settled to approximately 40 per cent solids. The clear liquor from this operation is weak wash and is used to dissolve the smelt from the black liquor-soda recovery furnaces. The solution of smelt in weak wash is "green liquor."

The settled mud from this operation is pumped to mud storage tanks where it is continuously agitated to insure uniform consistency. In some mills the mud is pumped from the mud storage tanks at approximately 40 per cent solids and fed directly to the rotary kiln. In other mills the mud is pumped from storage to rotary filters where the mud is washed with hot or cold water to effect a reduction in soda content. The resultant cake is then repulped with water to 40 to 53 per cent solids and fed to the kiln by means of centrifugal or reciprocating pumps. In more recent installations, the mud is washed and filtered on rotary filters and fed to the kiln by means of screw feeders. In at least two installations the filter cake is fed to the kiln by centrifugal pump which in turn is force fed by a screw conveyor.

In most mills the hot lime is slaked immediately upon discharge from the rotary kiln. Drag chains are usually employed to convey the hot lime to the slakers, the type and size of which differ in various mills. In the continuous causticizing system the hot lime, and the make up lime required, is slaked in a definite proportion of hot green liquor. The resultant mixture of partially causticized green liquor and suspended calcium carbonate, and calcium hydroxide is pumped to the remainder of the causticizing system where the balance of the green liquor required is added, and control and reaction time allowed. The resultant clear "white liquor" is withdrawn and the calcium carbonate again washed, settled, filtered, and reburned.

Figure 2 shows a typical modern installation of lime reburning equipment.

Major items essentially required for reburning lime sludge may be listed as follows:

1. Rotary kiln with drive
2. Exhaust fan
3. Dust collector
4. Filters
5. Kiln feeder
6. Fuel burning equipment
7. Instruments and controls
8. Hot lime conveying equipment
9. Make up lime facilities
10. Storage
11. Slaker
12. Refractories

Table 1—Typical Kilns and Nominal Capacities

Size kiln diam. and length (in feet)	No. of Supports	Kiln Motor (hp.)	Tons of Lime per day	Pulp mill Capacity tons of Pulp per day
6 x 100	2	10	22	100
7 x 120	2	15	35	150
7 x 200	4	20	50	225
8 x 140	2	30	50	225
7 & 8 x 250	4	40	75	335
8 x 300	5	60	110	500
9 x 175	2	50	90	400
8 & 9 x 300	5	60	125	550
9 x 300	5	75	150	675
10 x 175	2	60	110	500
10 x 300	5	100	180	800
11 x 175	2	75	135	600
11 x 300	4	125	225	1000

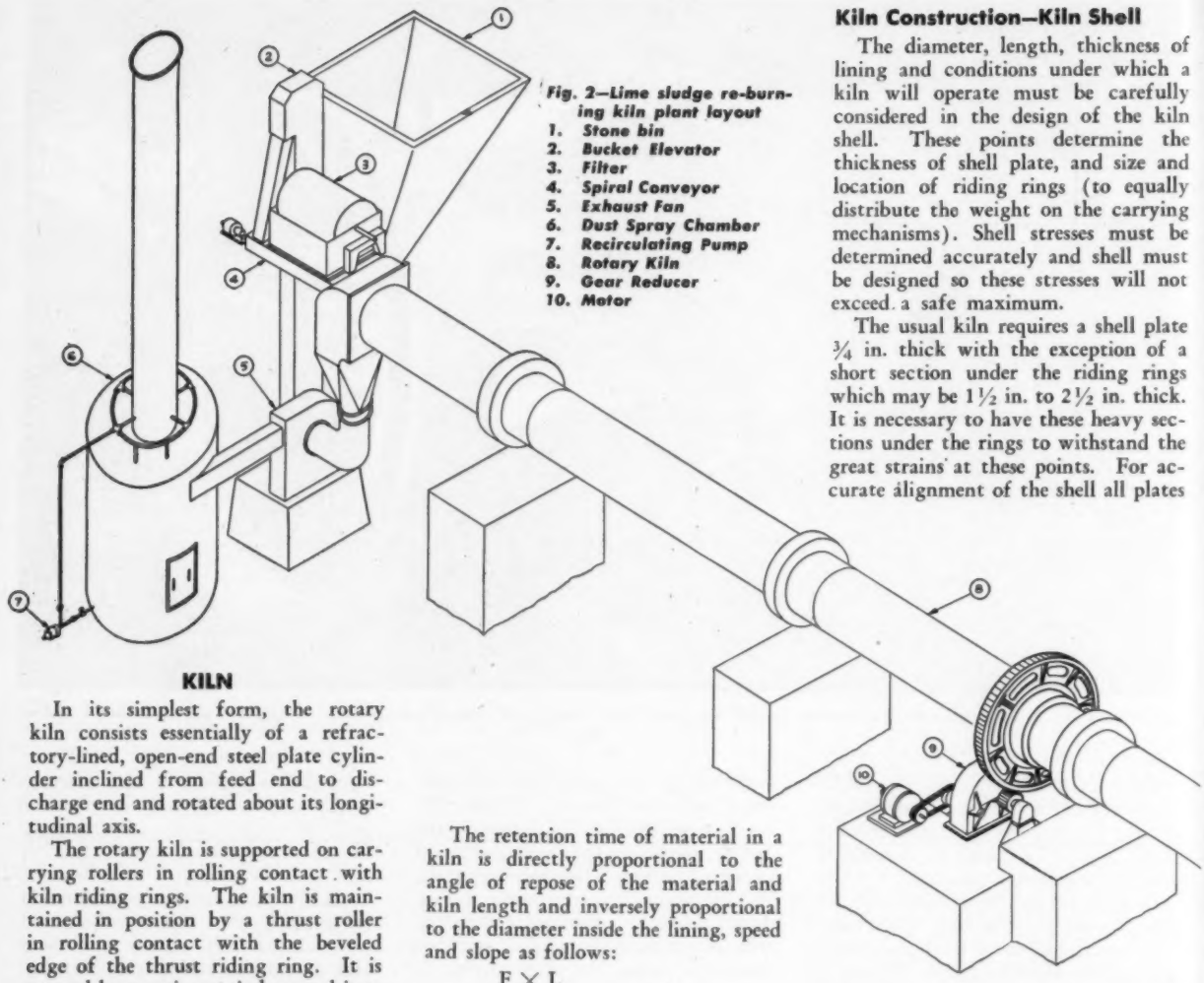


Fig. 2—Lime sludge re-burning kiln plant layout
1. *Stone bin*
2. *Bucket Elevator*
3. *Filter*
4. *Spiral Conveyor*
5. *Exhaust Fan*
6. *Dust Spray Chamber*
7. *Recirculating Pump*
8. *Rotary Kiln*
9. *Gear Reducer*
10. *Motor*

KILN

In its simplest form, the rotary kiln consists essentially of a refractory-lined, open-end steel plate cylinder inclined from feed end to discharge end and rotated about its longitudinal axis.

The rotary kiln is supported on carrying rollers in rolling contact with kiln riding rings. The kiln is maintained in position by a thrust roller in rolling contact with the beveled edge of the thrust riding ring. It is rotated by a main or girth gear driven by an electric motor through a multiple V-belt drive and an enclosed type reduction gear unit.

The size of a kiln is designated by the diameter inside the shell and the outside length when the kiln is cold. Lime sludge kilns now in operation range in size 6 ft. to 11 ft. in diameter and 100 ft. to 325 ft. in length.

The slope or inclination of the kiln may be from 5/16 in. to ¾ in. per foot depending on the diameter and length.

The operating speed of the kiln is usually about .9 rpm.

The movement of material from feed end to discharge end through the kiln can be accomplished only by the carry up of material to its natural angle of repose inside the brick lining in the direction of rotation of the kiln ("up-running side") and the subsequent cascading or "rolling-over" of material down its angle of repose toward the discharge end of the kiln. The extent of travel toward the discharge end is determined by the slope of the kiln.

The retention time of material in a kiln is directly proportional to the angle of repose of the material and kiln length and inversely proportional to the diameter inside the lining, speed and slope as follows:

$$R = \frac{F \times L}{S \times N \times D} K$$

where

R = retention time in minutes
F = Factor determined by angle of repose 11.2 for lime sludge kiln
L = length in feet
S = slope in degrees
N = speed in rpm
D = diameter inside lining in feet
K = factor determined by restrictions in kiln. 1 for usual kiln with no dam rings enlarged zones or other restrictions

Thus in a kiln 300 ft. long and 7 ft. diameter inside brick operating at .9 rpm on ½ in. per foot slope (2.38 deg.)

$$R = \frac{11.2 \times 300}{2.38 \times .9 \times 7} \times 1$$

R = 225 minutes

The retention time of material in operating lime sludge kilns ranges from approximately 90 minutes in the shorter kilns to approximately 240 minutes in the longer kilns.

Kiln Construction—Kiln Shell

The diameter, length, thickness of lining and conditions under which a kiln will operate must be carefully considered in the design of the kiln shell. These points determine the thickness of shell plate, and size and location of riding rings (to equally distribute the weight on the carrying mechanisms). Shell stresses must be determined accurately and shell must be designed so these stresses will not exceed a safe maximum.

The usual kiln requires a shell plate ¾ in. thick with the exception of a short section under the riding rings which may be 1½ in. to 2½ in. thick. It is necessary to have these heavy sections under the rings to withstand the great strains at these points. For accurate alignment of the shell all plates should be planed on four sides before rolling.

Shell plates should be rolled one plate to the circle to obtain a more truly circular section. This insures better fit of refractory lining, consequently, longer refractory life results. Most kiln shells are now welded using automatic subdued arc welding machines to insure perfect weldments.

The kiln structurally is a cylindrical beam and must be supported accordingly. Kilns of a length not more than twenty times the diameter have but two supports. Kilns of a length greater than twenty times the diameter are of the multiple support type and have four or more supports.

Kiln Riding Rings

Accurately machined riding rings usually of cast steel, or welded bartype, are mounted on the shell at the points of support. The riding rings are of the floating type, float mounted on formed filler bars which are welded to the kiln shell. The rings are retained in place by retainer bars welded

to the filler bars. One riding ring has a beveled edge which matches the thrust roller to retain the kiln in position. All other rings have straight edges.

Kiln Carrying Mechanisms

The entire weight of the kiln shell, lining, and charge, in large kilns amounting to hundreds of tons, is carried on two or more rolling supports called carrying mechanisms.

Carrying mechanisms consist of machined carrying rollers of either forged or cast steel, shrunk onto forged steel shafts which are carried on large bronze bearings seated in cast iron housings. The bearing housings are independently maintained in position on a common mechanism base and provided with jackscrew adjustment for alignment purposes. Bearings are water-jacketed and are oil lubricated. Oiling buckets attached to the ends of the shafts dip into the oil reservoir in the bearing housings, pick up the oil and shower it over the roller shafts. End thrust of the rollers is taken care of by means of renewable bronze thrust plates attached to the ends of the roller shafts.

To retain the carrying mechanisms in position, bases are bolted and grouted to concrete piers after alignment in erection.

Kiln Thrust Mechanism

Because of the slope of the kiln, a thrust mechanism is necessary to retain it in proper position on the supporting rollers. This consists of a beveled face cast steel thrust roller in rolling contact with the beveled edge of the thrust riding ring. The thrust rollers, one on the "up-hill" and one on the "down-hill" side of the thrust riding ring, are equipped with oil lubricated bronze bearings usually water-cooled.

The thrust riding ring fixes the plane on both sides of which the kiln expands. A kiln expands several inches longitudinally under heat and this expansion is accommodated in positioning the carrying mechanisms.

The thrust ring is located toward the feed end of the kiln where the shell is cooler than it is at the discharge end.

Kiln Drive

The kiln drive is located close to the thrust ring to maintain the main gear and the driving pinion in proper alignment regardless of expansion and contraction of the kiln.

The main or girth gear is made in halves with full machined teeth so gear may be reversed to obtain double life. The main gear is bolted to a gear ring flange which is welded to the kiln shell. The main driving pinion meshes with the main gear and is keyed to the low speed shaft of an enclosed gear reducer. The gear reducer is fixed to the foundation on the same slope as the kiln. The more recently installed reducers are provided with adjusting bolts and lugs on the reducer base plate to provide for adjustment or alignment of the drive.

Older kilns are driven through a train of gears, but the enclosed gear reducer is used on all modern installations which also incorporate a totally enclosed lubrication housing which encloses the main gear, main pinion and lubricating pinion. The main gear and pinion are lubricated with a heavy fluid grease.

The gear reducer is provided with an outboard bearing on the low speed shaft with the high speed shaft usually connected to the motor by a multiple V-belt drive. Sometimes reducer and motor are directly connected; however, multiple V-belt drive connection provides greater flexibility if the range of kiln speeds is changed. For lime sludge kilns four speed a-c motors which must be high starting torque motors have proved the most satisfactory. The correct reducer ratio, multiple V-belt drive and motor speeds are selected to give the proper kiln speeds required for operation. Kiln speeds are usually 1.2/.9/.6/.45 rpm or 1.33/1/.67/.5 with the third high speed used for normal kiln operation.

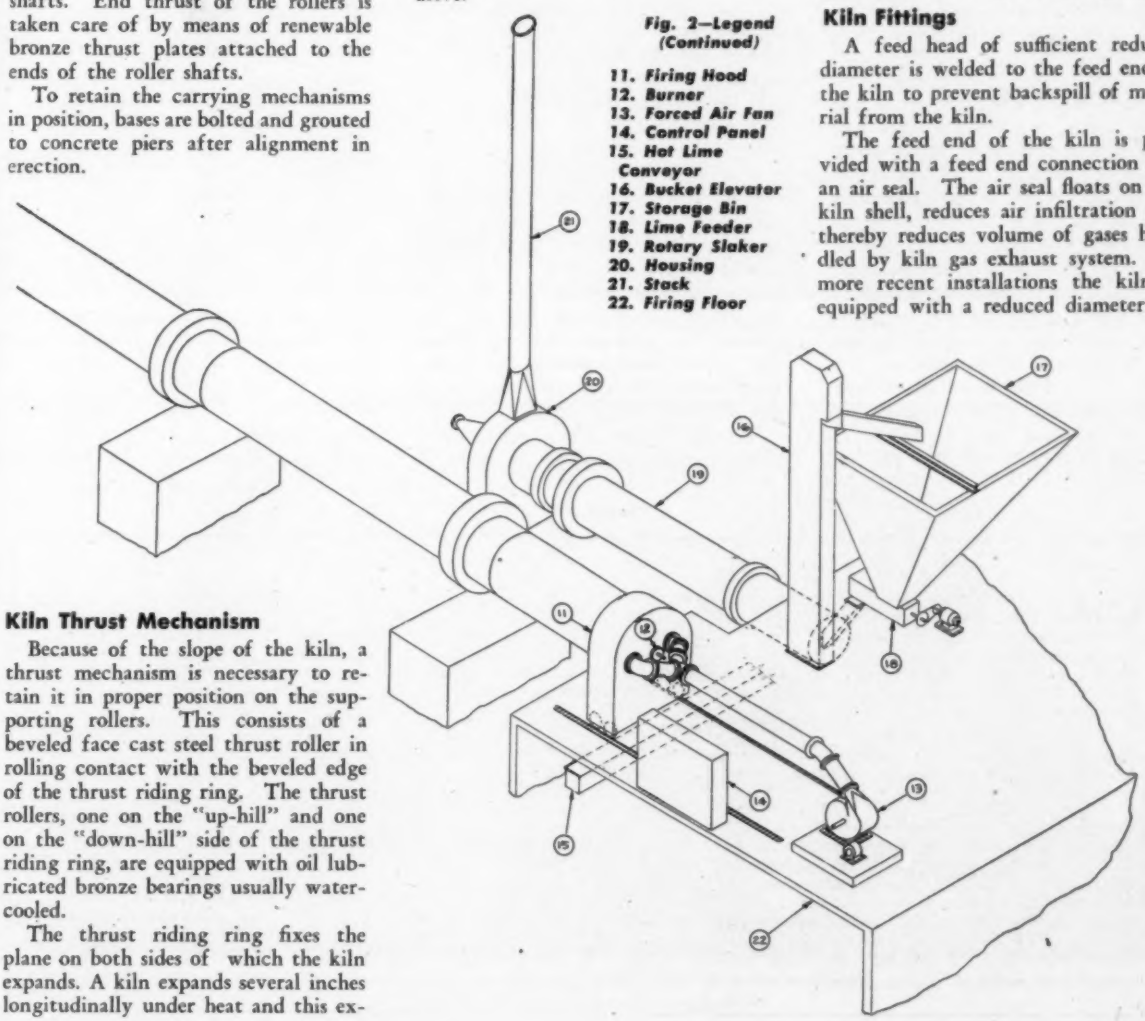
Kiln Fittings

A feed head of sufficient reduced diameter is welded to the feed end of the kiln to prevent backspill of material from the kiln.

The feed end of the kiln is provided with a feed end connection and an air seal. The air seal floats on the kiln shell, reduces air infiltration and thereby reduces volume of gases handled by kiln gas exhaust system. In more recent installations the kiln is equipped with a reduced diameter air

Fig. 2—Legend (Continued)

11. ***Firing Hood***
12. ***Burner***
13. ***Forced Air Fan***
14. ***Control Panel***
15. ***Hot Lime Conveyor***
16. ***Bucket Elevator***
17. ***Storage Bin***
18. ***Lime Feeder***
19. ***Rotary Slaker***
20. ***Housing***
21. ***Stack***
22. ***Firing Floor***



seal further reducing the amount of tramp air entering the exhaust system.

The discharge end of the kiln is fitted with a sectional cast alloy iron brick retaining ring to retain the nose brick. It also protects the kiln shell against the heat given off by the hot material discharging from the kiln.

The discharge end of the kiln is enclosed by a refractory lined steel plate firing hood mounted on wheels. A single bar type seal runs in close clearance with the back of the firing hood to limit excess combustion air which may enter the kiln. Firing hoods (Figure 3) are provided with access and inspection doors. Grate bars in the bottom of the firing hood prevents oversize material or loose bricks from getting into slaker or other following equipment.

Fuel required for reburning lime sludge is introduced to kiln through burner opening in firing hood.

Development of Kiln Application

Many of the early sulphate pulp mills were installed on a minimum investment for small capacities and initial cost was a primary consideration. Most mills initially started operations buying lime but soon realized the economies in reburning lime. (A ton of lime can be reburned for about half the cost of new lime.) Again initial cost was a primary consideration in the purchase of reburning equipment.

Probably for this reason more than any other, most rotary kilns operating in sulphate pulp mills today are relatively short two support kilns. These would prove the least expensive initial investment and would operate with a minimum of maintenance.

The early kiln installations were usually not too efficient relative to fuel consumption, ranging from 15,000,000 to 25,000,000 Btu required per ton of kiln product. In about 1935, when close attention was being given to economy, a heat recuperating chain system was developed for use in kilns handling a wet feed. A chain system consists essentially of chain, hangers, and spirals arranged in the feed end of a kiln to more effectively extract the heat from the hot gases, usefully transferring this heat to the wet feed. In kilns equipped with a chain system the exit gas temperature, depending upon the length of the kiln, will range between 300 and 450 Fahr. In kilns not equipped with chain system the exit gas temperature would be much higher and in shorter kilns could be as much as 1200 Fahr.

The difference in the exit gas temperature is, of course, reflected in the fuel consumption per ton of kiln product.

An example of results obtainable with a chain system is illustrated in the recent installation of a chain system in a short kiln not previously operated with chains. As a result of the chains, the fuel consumption was reduced 30 per cent, exit gas temperature materially reduced, and capacity increased 10 per cent.

A heat recuperating chain system is arranged within the feed end of a kiln, in such a manner, that, when the kiln is rotated, the heat transferring chains alternatively dip into the wet material and are lifted out covered with a coating of material. This action exposes a large surface area of the material to the hot gases passing through the kiln. In drying, the material falls off the chains. The heat recuperating chains also absorb heat from the hot gases, transferring this heat when they again dip into the wet material.

In the efficient chain system, the chain curtain is formed of units in transverse planes of the kiln. Successive units are displaced angularly to form a definite pattern. The individual chains are suspended from hangers to prevent tumbling over each other on the bottom of the kiln, thereby avoiding excessive wear on the chain and the kiln lining. The density of the suspended chain curtain decreases from the top to the bottom of the kiln. An open space is maintained just above the bottom of the kiln to induce the hot gases to flow directly over the material.

A suspension of chain curtains has a retarding action on the flow of material. However, the incorporation of internal spirals overcomes this retardation and has the definite effect of conveying the material through the chain system at a uniform and continuous rate. The spirals also provide additional heat transferring surfaces, as well as a means of suspending the chains, which are bolted to the spirals.

The heat recuperating chain system has materially increased the efficiency of heat utilization in rotary lime sludge kilns which reduces fuel required per unit of production.

Most of the kilns installed in the years between 1935 and 1941 were short two support kilns equipped with chain systems. Creditable fuel consumption is being obtained in these kilns and averages about 10,000,000 Btu per ton of kiln product.

During the war years purchase of a new equipment was held to a bare minimum and no new kilns were installed.

In any progressive industry, once the basic process is proved, constant investigation and research are maintained to find improved methods and economies in operation. This is true in the sulphate pulp industry and considerable thought has been given to

Table 2

		Btu	Per cent
	Heat H_2O 70 deg. Fahr. to 212 deg. Fahr. = 2540 x (212—70) =	360,000	4.0
	Evaporate H_2O @ 212 deg. Fahr. = 2540 x 970 =	2,460,000	27.5
*	Superheat H_2O to 400 deg. Fahr. = 2540 x (400—212) x .47 =	225,000	2.5
†	Decompose carbonate = 1800 x 1385 =	2,510,000	27.7
‡	Heat in material (discharged at 1800 deg. Fahr.) = 2000 x (1800—70) x .25 =	868,000	9.7
‖	Heat in CO_2 (leaving at 400 deg. Fahr.) = 1800 x (400—70) x .25 =	150,000	1.7
¶	Radiation = $\frac{8 \times 300 \times 3.1416 \times 600 \times 24}{100}$ =	1,080,000	12.1
	Heat lost in products of combustion leaving at 400 deg. Fahr. =	1,120,000	12.5
§	Loss in steam for oil atomization leaving at 400 deg. Fahr. =	200,000	2.3
	Total	8,973,000	100.0

* Specific heat of water vapor taken at .47

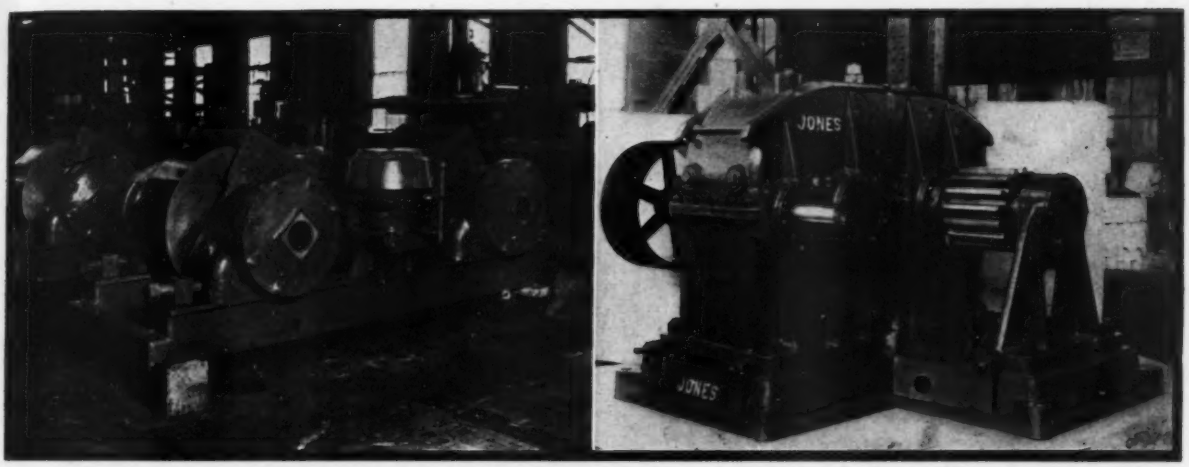
† Heat required for dissociation of calcium carbonate from and at 70 deg. Fahr. taken at 1385 Btu per pound of CaO.

‡ Calcined material is discharged at a temperature lower than the maximum attained in the kiln; this is due to the cooling of the material in heating the fuel air mixture in the discharge end of the kiln. Specific heat of material assumed to be .25.

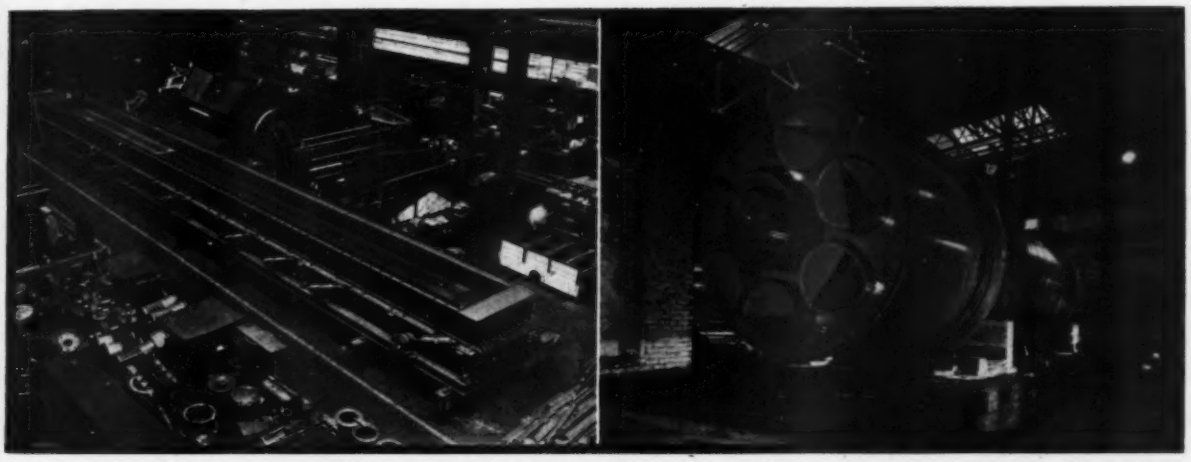
‖ Heat in CO_2 evolved in dissociation of carbonate. Specific heat assumed to be .25.

¶ Radiation loss through shell to atmosphere taken at 600 Btu per hour per sq. ft. of kiln shell. Loss per ton based on a production of 100 tons of lime per day.

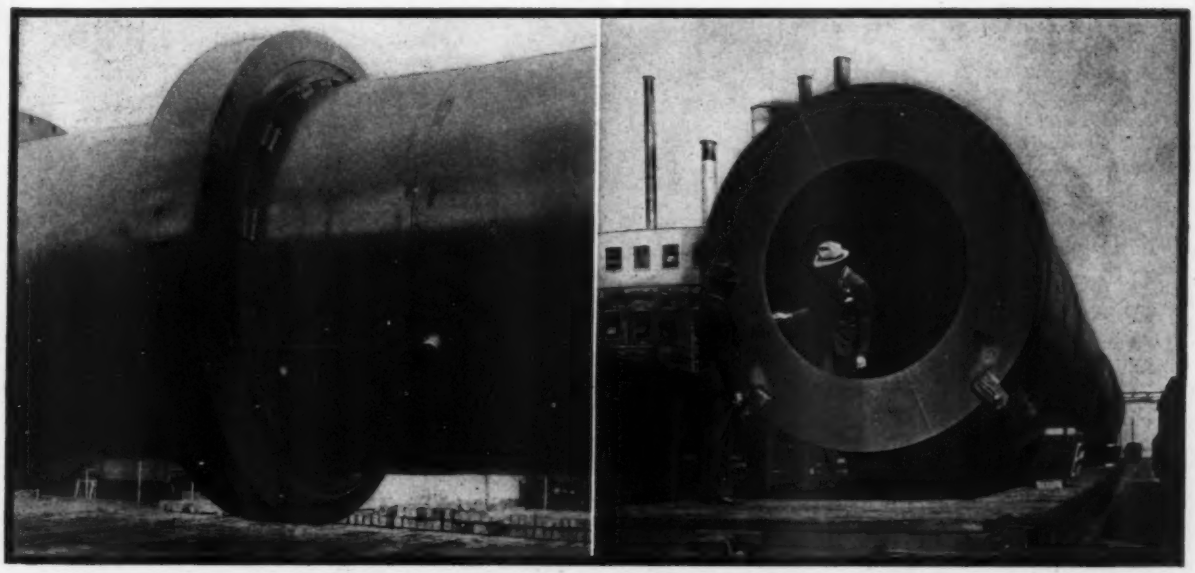
§ Steam required for atomization will range between 2 and 5 lb. per gallon of oil. Heat loss assumed to be 1,100 Btu per pound from water at 70 deg. Fahr. to steam at 400 deg. Fahr.



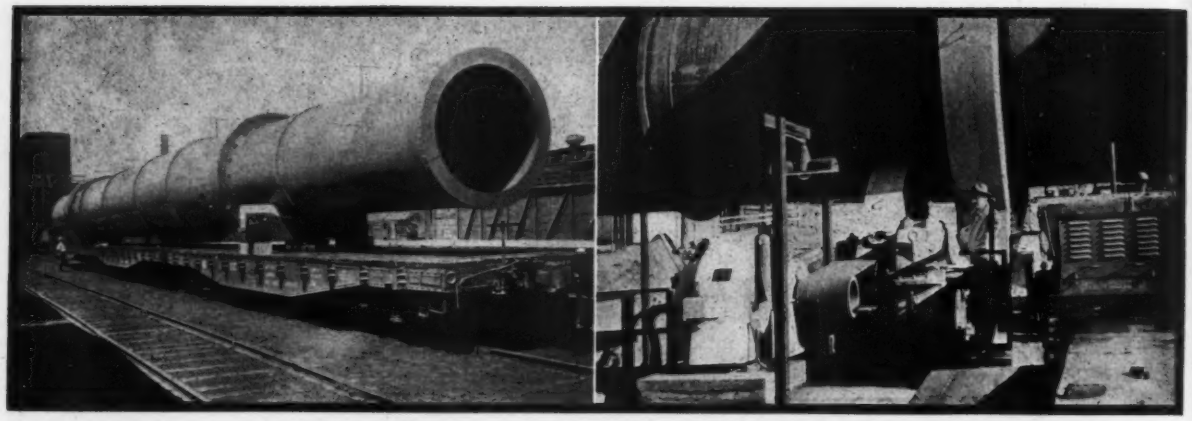
LEFT—Kiln carrying mechanism and thrust mechanism . . . RIGHT—Reduction gear reducer with outboard bearing and main drive pinion on low speed shaft. Reducer and outboard bearing adjustable on base plates



LEFT—View from discharge end of shaking type of cooler, showing grates, cooler body, drive mechanism and supporting structure. Cooler operates with a stationary brick lined air housing over its top . . . RIGHT—Indirect tube type of rotary cooler viewed from discharge end



LEFT—Floating type riding ring mounted on kiln shell and showing heavy shell section under riding ring . . . RIGHT—Kiln feed end shell section showing feed end head



LEFT—Kiln view showing method of shipment and also discharge end T section brick retaining ring . . . RIGHT—Installation view of kiln drive showing motor, multiple-V-belt drive, gear reducer, with gasoline engine auxiliary drive for use in the event of power failure

savings possible in reburning lime. Fuel cost is the greatest single production expense in reburning lime sludge. With most operating kilns being short two support kilns it was natural to consider the use of long multiple support kilns similar to the kilns being applied in the cement industry. In the cement industry which is highly competitive, when increased capacity and decreased fuel costs were demanded, increasingly longer kilns were installed. The longest kiln installed in the western hemisphere is a cement kiln, 11 ft.-6 in. diameter by 475 ft long, carried on seven supports.

Only two long kilns having a length greater than twenty times the diameter were reburning lime sludge (in the sulphate pulp industry) prior to the end of World War II. The larger of these, an 11 ft. by 250 ft. four support kiln, has long been operating at the greatest capacity, and at the lowest comparable fuel consumption, reburning lime sludge containing approximately 55 per cent water, using natural gas for fuel.

Many operators consider it advantageous to utilize a short two-support kiln of larger diameter than would be usable in a long multiple support kiln for the same capacity. They feel that a short two-support kiln will be more flexible in system operation and better able to take care of fluctuating demands. They likewise believe that a short two-support kiln will give a greater continuity of operation, being less prone to process operational trouble.

However, as in other industries utilizing rotary kilns, among them, cement and lime, it has been found that the fuel economy possible in long kilns is a major consideration in the selection of equipment. Multiple support kilns are operated with a minimum of operational and maintenance problems. These problems actually turn out to be minor problems, held to a minimum by close attention to operation.

Table 1 lists typical kilns and nominal capacities.

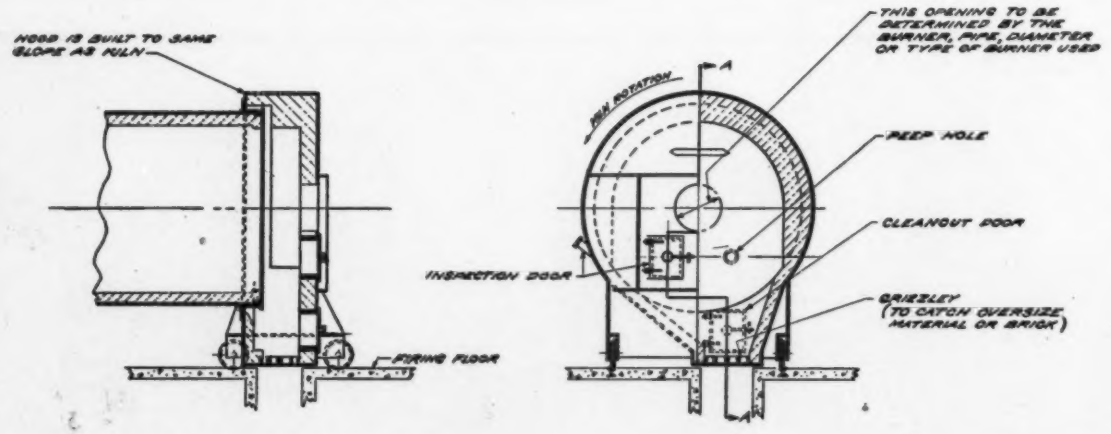
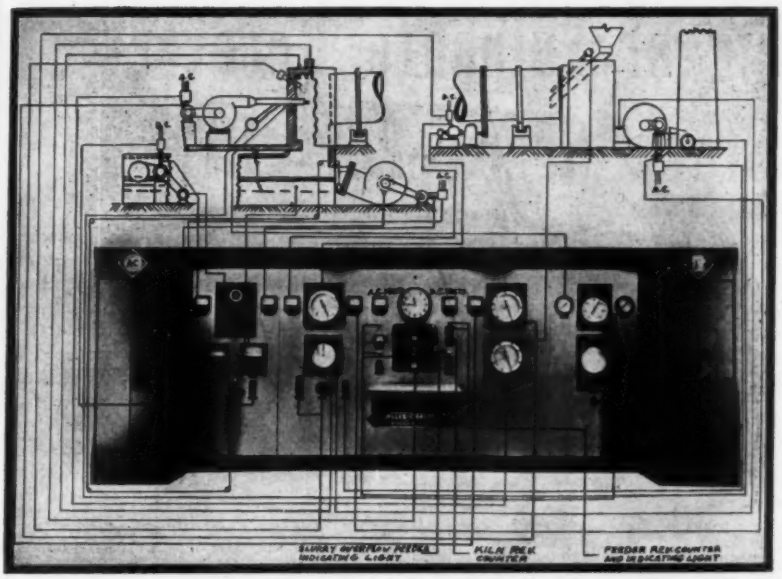

HOOD IS BUILT TO SAME SLOPE AS KILN
THIS OPENING TO BE DETERMINED BY THE BURNER, PIPE, DIAMETER OR TYPE OF BURNER USED
KILN ROTATION
A
PEEP HOLE
CLEANOUT DOOR
INSPECTION DOOR
GRIZZLEY (TO CATCH OVERSIZE MATERIAL OR BRICK)
FIRING FLOOR
SECTION - A'A'

Fig. 3 — Rotary kiln — standard firing hood

KILN ROTATION — STANDARD KILN ROTATION IS CLOCKWISE VIEWED FROM FEED END OF KILN AND COUNTERCLOCKWISE WHEN VIEWED FROM FIRING HOOD END.



A master kiln control panel for two-kiln, two-cooler installation with instruments connected to show record of performance being obtained, recording feed end temperature, burning zone temperature, kiln speed, cooler speed, cooling air flow, draft and controlled draft

MATERIAL AND HEAT BALANCE

Fuel consumption in chain system equipped kilns reburning lime sludge containing approximately 40 per cent water, in short two-support kilns can be about 10,000,000 Btu per ton of kiln product. Fuel consumption can be about 9,000,000 Btu or less in long multiple support kilns. The exit gas temperature in chain system equipped kilns will be about 400-550 Fahr. for short kilns and 300-400 Fahr. for long kilns.

Calcium carbonate will dissociate at a temperature of about 1,500 Fahr. Therefore, lime sludge could be heated to this temperature (discounting effects of impurities) and held at this temperature until the dissociation is completed. However, this dissociation process is one which is accelerated at elevated temperatures. Consequently, in a rotary kiln, to facilitate this dissociation of the various sized pellets of the carbonate in a reasonable retention time, temperatures in excess of 1,500 Fahr. are necessary. In short kilns retention time is short, therefore, material treatment temperature necessary to calcine the lime will be high to accomplish the recovery of lime, being about 2300 Fahr. In a long kiln the retention time is long, therefore more gradual heating will take place which results in a lower maximum temperature necessary to properly calcine the lime, being about 2000 Fahr. These facts mean lime will discharge at a lower temperature from a long kiln and, therefore, there will be less heat lost in the lime discharged from a long kiln than in the lime discharged from a short kiln.

In an 8 ft. diam. kiln having a length of 300 ft. (37½ times the diameter) with 40 per cent water in the sludge feed, the exit gas temperature would be approximately 400 Fahr. With 90 per cent calcium oxide and 10 per cent impurities in the reburned lime there would be a material balance per ton of lime as follows:

	Pounds
Calcium oxide, CaO	1800
Impurities in lime	200
Carbon dioxide evolved, CO_2	1800
Water evaporated, H_2O	2540

Note, that the amount of carbon dioxide evolved is not in accordance with the molecular formula of $CaCO_3$, but CaO and CO_2 have been taken at 50 per cent of the carbonate to take into consideration dust and other losses not otherwise considered in a lime kiln heat balance.

Assuming a base temperature of 70 Fahr. with 40 per cent water in the feed, and Bunker C oil fuel, the fuel consumption would be approximately 9,000,000 Btu (61 gallons of Bunker C oil) per ton of kiln product calculated as shown in the heat balance (Table 2).

The heat balance indicates a fuel consumption which should be readily obtainable. With close attention to operating detail it is possible the fuel consumption could be somewhat decreased.

In process operation there is usually a small amount of lime lost at various points, some with the grits or impurities removed by the slaked lime classifier. A few mills make up this lime lost by burning added carbonate in the form of dry limestone or oyster shells introduced with the lime sludge feed. This would also lower the fuel consumption, the amount depends upon the make up lime burned, because the stone or shell is a reasonably dry feed and will lower the percent total water in the feed per ton of lime produced.

Method of installing brick in a rotary kiln

This article is in two parts. Part II will appear in an early issue.

The Scrubbing of Sulphate Recovery Furnace Stack Gases---Part III*

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Thilmany Pulp & Paper Co.

A Pilot Plant Study of the Pease-Anthony Scrubber and the Venturi-Scrubber

Discussion of Data

▶▶▶ THE DATA clearly show the effects of several variables in the scrubbing of kraft recovery furnace stack gases in the conventional Pease - Anthony Scrubber, and/or the newly developed Venturi-Scrubber. It must be realized that these studies have been made on a pilot plant scale, and the data are useful to predict the size and details of suitable mill-scale installations.

In connection with "collision theory" of scrubbing, Kleinschmidt and Anthony (*1*) have given the following expression for the efficiency of scrubbing of gases in a cyclonic spray tower:

$$\text{Efficiency} = 1 - \frac{1}{e^{(3DW/4dG)}}$$

e — natural log base
D — diameter of scrubber, inches
W — effective volume of water sprayed, cfm
d — diameter of water droplets, inches
G — volume of gas, scrubbed, cfm

If the diameter (D) of the pilot plant P-A tower used in these tests had been doubled, theoretically the same quantity (W) of water of equal droplet size (d) would then have scrubbed twice as much gas traveling at one-half the original vertical velocity as it would have scrubbed in the smaller tower at the same calculated dust removal efficiency. According to the equation, doubling the diameter is equal to spraying twice as much water which would double the pump power requirement.

An increase in diameter of the scrubber together with an increase in the amount of liquid sprayed could be carried out to the point where there would be physical limitations on the diameter of the scrubber and the amount of liquid sprayed from a given length of spray manifold. In addition, the centrifugal force decreases with increase in diameter and, therefore, small droplets may actually drop out at large diameters before reaching the wall of the scrubber. It would be best to determine the point where the law of diminishing returns would begin to operate; i.e., the desired, constant efficiency of scrubbing of a constant volume of gas where the total chemical recovery per cubic foot of liquid spraved would begin to decrease after reaching a maximum. Unfortunately, no thorough studies of these factors for the P-A cyclonic spray towers have ever been made and commercial installations have been designed conservatively in the past in this respect because most of the applications have been the first in some particular field.

The economy of the scrubbing operation is dependent upon keeping the total power requirements for any given efficiency at a minimum, and, for this reason, against the saving in power used for atomizing the scrubbing liquid resulting from an increase in the diameter of the scrubber, it would be necessary to charge the increased draft fan power required to handle the gas at a higher spin velocity or to accelerate the weight of water sprayed in a tower of larger diameter.

It also should be noted that in attempting to reduce the power requirements of a cyclone spray tower to a minimum, it is necessary to choose spray nozzles which will give the desired scrubbing efficiency with the lowest power demand for the scrubbing liquor pump.

Figures 5 and 6 illustrate the improvement in efficiency resulting from using cool water instead of hot fume solution to scrub stack gases in the P-A cyclone spray tower. Either the droplets of water resulting from condensation of moisture in the gas perform some additional scrubbing or the moisture condenses on fume particles serving as nuclei, with the result that their size is increased and they are more easily scrubbed from the gas. Perhaps both of these effects operate.

It is possible to obtain the advantageous effect of condensation while scrubbing in processes where the scrubbing liquor can be discarded after one pass-through. Two other methods of obtaining the same effect with a cooled recirculated solution are: the condensate gained by the scrubbing liquid can be evaporated (1) under vacuum; or (2) in an aeration tower with the scrubbing liquid cooled to perform further condensation when used again. The latter process has been used in the stack gas scrubbing system devised by Tomlinson and coworkers (*13*). Since a concentrated solution of the fume recovered in scrubbing sulphate recovery furnace stack gases can be used for make-up chemical, it is necessary to use a hot, recirculated solution which will become saturated or, if a cooled solution is used, to concentrate the solution and eliminate the condensate by evaporation as previously described.

In considering Figures 5 and 6, it must be kept in mind that the liquid to gas ratio would have been reduced or the gas through-put at constant liquor rate increased to give an equivalent percentage efficiency of sodium removal if the diameter of the P-A Scrubber had been increased within the limits previously mentioned. It also must be realized that an increase in the pressure of the liquid sprayed also plays an important role in obtaining higher efficiencies of sodium removal. The Spraco XPJ-050 nozzles used were known to give good atomization at 150 psi pressure and for operation of the collision theory this was considered a good arbitrary value of spray pressure. From the standpoint of obtaining the highest sodium removal efficiency it appears that pressures even higher than 150 psi would be desirable but, from the power requirement outlook, it might be found that the optimum spray pressure would be much lower. The lower the spray pressure, the more liquid per unit of gas it would be possible to scrub with and still require no increase in power consumption. As later discoveries shifted the emphasis away from the conventional Pease-Anthony cyclonic spray tower, no studies were made to determine the optimum diameter of scrubber, spray pressure, and liquid quantity at the point of minimum total power requirement for a given efficiency of sodium removal by this unit.

The major discovery made during

(*) This is the third and final installment of Mr. Collins' article. Parts I and II appeared in the August and September issues (respectively) of this magazine. Bibliographical references before No. 13 appeared with Part I. Illustrations and tables to which reference is made in this part, appeared with Part II.

this investigation was that the Venturi Atomizer, followed by a dry cyclone to remove entrainment, is a new and novel type of scrubbing apparatus. This unit was installed after Johnstone (*14*) formulated the "diffusion theory" and made calculations as to its possible effect. This theory has been summarized previously by Collins, Seaborne, and Anthany (*2*).

In order to provide the water droplets in the gas stream for the dust to be removed by "diffusion," the Venturi Atomizer was installed preceding the inlet of the conventional Pease-Anthony Scrubber. The first exploratory runs immediately indicated that the combination makes possible very great increases in scrubber efficiencies when operating on fine fume; such as that in Kraft recovery furnace stack gases.

The first Venturi Atomizer throat of 4 in. i.d. was too limited in capacity (1,500 cfm). Efficiencies of sodium removal of the combination scrubbers reached 99 per cent and were in most cases so high that slight differences in operating variables could not be studied. Because of that, a 5⅜-in. i.d. throat was studied next. The data for the study of the combination operating under the "diffusion theory" are given in Figure 7. As can be seen readily, the Venturi Atomizer itself becomes a highly efficient scrubber when sufficient liquid is uniformly distributed in the throat. In combination with and followed by the conventional Pease-Anthony Scrubber, the use of the Venturi Atomizer enabled easily the attainment of scrubbing efficiencies heretofore believed to be difficult to reach with conventional scrubbing equipment.

Figure 8 gives an interesting comparison of quality of atomization and quantity of liquid sprayed in the P-A Scrubber preceded by the Venturi Atomizer operating with a moderate feed of liquid into the throat. Test runs were made with the P-A Scrubber sprays operating at 150 psi pressure and using none, 1/3, 2/3, and all of the 52 nozzles. A run was also made using all the P-A Scrubber nozzles operating on 60 psi pressure. During these tests, conditions of gas and liquid flow through the Venturi Atomizer were maintained constant. The results show that, with the Spraco XPJ-050 nozzles used, an equivalent quantity of liquid sprayed at a higher pressure will give a higher efficiency of fume removal. However, it should be pointed out that, where the power requirement to obtain a given efficiency of say 90 per cent is of major importance, it may be more economical to spray more liquid at a somewhat lower pressure in the P-A Scrubber to obtain an equivalent efficiency. When cleanliness of scrubbed gas is all-important and power cost no limiting factor, then unquestionably the higher spray pressures are to be desired.

In the early trials with the combination of scrubbers, it was observed that practically all of the liquid injected into the gas passing through the venturi throat was thrown out when the gas stream made the first right angle turn in the retention tower.

At no time during these studies could it be determined that any improvement in efficiency of scrubbing resulted from allowing the extra delay time for contact after the Venturi Atomizer between the liquid droplets and the gas.

With a new conception of a more instantaneous "diffusion" taking place in the Venturi Atomizer as the possible phenomenon occurring, the retention tower was removed from between the Venturi Atomizer and the P-A Scrubber, and the shell of the latter was used as a dry cyclone to remove the entrained liquid from the gas after it was passed through the Venturi Atomizer. This combination was appropriately named the Venturi-Scrubber and was used as the basis for further investigations.

In the tests represented by Curve A of Figure 7, the six liquid jets into the venturi throat were throttled equally to adjust the liquid rate. To see what effect on scrubbing efficiency would result when the liquid distribution in the throat was changed, a series of tests, Curve B, Figure 9, were run in which the velocity of liquid through the jets was maintained constant and the liquid volume was adjusted by varying the number of jets used. The results indicate that changes in liquid distribution in the venturi throat can result in increased scrubbing efficiency in the lower values for the ratio of liquid to gas. In this case, apparently the liquid shoots out into the center of the throat and better atomization takes place when the liquid velocity through the feed jets is kept constant.

It should be pointed out that it is extremely important to get the optimum throat distribution of liquid at low values for the ratio of liquid to gas because the power requirements for the Venturi Scrubber are dependent to a large extent upon the *amount* of water which must be atomized to reach a desired scrubbing efficiency.

Up to this point, the effect of varying the liquid rate at a constant gas rate had been studied as well as the effect of velocity of injection of liquid into the venturi throat. In order to study the other obvious variable, the velocity of the gas passing through the venturi throat, a number of tests were run at constant liquid to gas ratios but at varying gas velocities in the throat. These results are shown in Figure 10. Unfortunately, limitations of the induced draft fan made it impossible to study the effect on scrubbing efficiency of average gas velocities considerably above 300 fps at liquid to gas ratios of 3 gallons per 1000 cubic feet or less. In all these tests the more desirable condition of keeping the liquid injection velocity constant while adjusting the liquid rate by varying the number of jets was maintained. A noticeable improvement in scrubbing efficiency resulted from using hot, recirculated fume solution for scrubbing in preference to an equal quantity of cool water. This is the reverse of the effect of using a hot scrubbing solution in the P-A Scrubber and indicates that in the Venturi-Scrubber the effect of condensation of part of the gases is negligible or is obscured by a combination of other factors.

The data shown in Figure 10 has been replotted in Figure 11 so that an idea can be obtained of the actual pressure drop occurring across the Venturi Atomizer relative to varying gas velocity through the throat at various liquid to gas ratios and for various scrubbing efficiencies. Examination of the curve of 90 per cent scrubbing efficiency leads to the conclusion that, when using a hot fume solution, a pressure drop of 13 to 14 inches w.g. across the Venturi Atomizer will result when using 3 to 5 gallons of liquid per 1000 cubic feet of entering gas at average velocities of gas through the throat of 260 to 325 fps. Since the amount of power to be applied to the induced draft fan is proportional to the pressure drop, it is necessary to choose the most economical point at which a desired efficiency can be obtained. The results show that more pressure drop across the Venturi Atomizer occurs when atomizing a given quantity of hot solution than when using cool water under the same conditions.

The curves of Figure 12 give the calculated power requirements for the various *pilot plant* scrubber combinations with certain limitations. The assumptions used in making these calculations have been previously given so there is no need to discuss them again. In passing, it should be pointed out that it is difficult to compare

power data for the Pease-Anthony Scrubber with that for the Venturi-Scrubber because of the importance of the "increase in diameter" factor in the case of the former. Actually, in a Pease-Anthony Scrubber of sufficiently large diameter, the power requirement might be comparable with that of the Venturi-Scrubber for an equal efficiency of fume removal. However, the elimination of filters, spray nozzles, and high pressure pumps necessary in the case of spray towers would make the simple, by comparison, Venturi-Scrubber a more suitable apparatus even at somewhat higher power cost.

The data in Table 1 is important as it shows the approximate composition of the chemical make-up available if fume recovery is practiced at Thilmany. The total sulphur compounds are on the average almost sufficient to make the fume equal to a chemical make-up solution with half of its sodium in the form of salt cake and the other half in the form of sodium bicarbonate. The return of these chemicals to the kraft recovery system at a lower ratio of sulphur to sodium content than occurs in sodium sulphate will naturally result in a lowering in the sulphidity of cooking liquor unless steps are taken to retain more sulphur in the system or to add extra sulphur in some form at various points in the process.

More complete analyses of the fume and sulphur-containing gases in the stack gases are given in Table 2. The tremendous quantity of sulphur in the form of hydrogen sulphide lost in the stack gases makes it very difficult to maintain a desirable value of sulphidity of cooking liquor. This loss of sulphur from the system in the form of hydrogen sulphide out of proportion to sodium may occur to some extent as a result of action of carbon dioxide and sulphur dioxide on the black liquor in the disc evaporators and it may result upon the destructive distillation of the black ash as it dries in the furnace. The design and methods of operating the furnace may be to a large degree responsible for the low sulphur content of the recovered fume as well as the high sulphur loss in the form of hydrogen sulphide but to date there is available no data which indicates the factors influencing sulphur losses.

Figures 13 and 14 show a comparison of the atomization and distribution of liquid in the throat of the Venturi-Atomizer when a small amount of liquid was injected from a single nozzle at low velocity (Figure 13) and more was injected at a higher liquid velocity through one nozzle (Figure 14). In both cases, the average velocity of gas through the throat was high.

Figures 15 through 17 illustrate very clearly the relative degree of atomization obtained at different average gas velocities in the throat of the Venturi-Atomizer. At low gas velocity (Figure 15) the droplets are very coarse and do not fill the throat with a curtain of liquid. Experience gained in testing the Venturi-Scrubber on sulphate recovery furnace fume would indicate a very low efficiency of scrubbing with such a coarse dispersion and poor distribution of water in the throat of the atomizer. However, the degree of atomization and quantity and distribution of the liquid resulting at the gas velocities in the venturi throat as shown in Figures 16 and 17 are known to correlate with approximately 85 to 90 per cent removal of sulphate recovery furnace fume in the pilot plant tests. These photographs and their interpretation in the light of the pilot plant tests of the Venturi-Scrubber indicates that one of the major problems in obtaining successful operation and efficient chemical recovery with a Venturi-Atomizer with a large throat will be the optimum distribution of the scrubbing liquid in the throat of the atomizer.

The interpretation of the theoretical aspects of the Venturi-Scrubber and the reasons for its remarkably high efficiency (for a scrubber) of recovery of sulphate recovery furnace fume are not so simple. At the present time, considerable fundamental research and commercial application are being carried out on the Venturi-Scrubber, and undoubtedly its mechanism of scrubbing will become much better understood when this work has progressed further. However, certain facts are evident from this preliminary investigation.

1. The Venturi-Scrubber is as efficient on fine fumes as the most efficient scrubbers which have previously been designed. This is apparently true from the standpoint of power requirement and the percentage of recovery of fume.

2. It appears that the data for the pilot plant Venturi-Scrubber may be projected into a full-scale installation on a directly proportional basis. The venturi throat area for full scale would be chosen to handle the total amount of gas at the desired gas velocity and the same range of ratios of liquid to gas would be used as has been found necessary in the pilot plant studies. It should be pointed out, however, that in a large throat much of the scrubbing liquid will have to be distributed from pipes or nozzles spaced in the throat so that the atomized liquid will fill the throat.

3. The Venturi-Scrubber successfully washes gas with considerably less liquid than is employed in conventional scrubbers. The optimum values with proper throat distribution and gas velocities appear to range from 3 to 6 gallons per 1000 cubic feet of entering gas.

4. Under the conditions of gas velocity and liquor rate existing in the venturi throats used in this investigation, the droplets atomized in the throat were mostly coalesced or impinged on the walls before they reached the outlet of the venturi section.

5. The breaking up of the streams of water due to the energy of the gas results in the formation of filaments and droplets of liquid under conditions of extreme turbulence and violent mixing of the gas and liquid.

In addition to the interesting technical aspects of the Venturi-Scrubber, it is quite important to consider the economics of the operation. As is true of any problem in which scrubbers are required, it is necessary, if possible, to reclaim chemicals which have some monetary and/or reuse value. The case of sulphate recovery furnace fume is an ideal proposition of this sort on which to base an economic justification for this new apparatus. Because of the fact that a full-scale Venturi-Scrubber is now in the process of construction at the Thilmany Pulp & Paper Company at Kaukauna, Wisconsin, it has been deemed advisable to base final economic studies upon that unit after it is completed and has been in operation for some time.

Acknowledgment

The author wishes to express his appreciation to M. G. Schmitt, Lloyd Broehm, and Janet Playman, all of the Thilmany Pulp & Paper Company, for help in making this investigation. M. G. Schmitt and W. Elworth are to be credited for the photographs. Dr. H. F. Johnstone, professor of chemical engineering at the University of Illinois, suggested the possibility of removing small dust particles by means of Brownian diffusion and, in conjunction with A. W. Anthony, Jr., of the Pease-Anthony Equipment Company of Waltham (Mass.), proposed the use of the Venturi Atomizer. Their assistance and advice are gratefully acknowledged.

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Sectional Paper Machine Output Increased with Electronic Regulator

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▶▶▶ OPERATING RESULTS on a 20-year-old sectional electric drive paper machine controlled by an all-electronic speed matching regulator show an increase in production, an extremely uniform draw maintained consistently, and a greater flexibility and stability of the paper machine drive. These results are of interest insofar as they have been accomplished on a revamped paper machine at the Tyrone (Pa.) mill of the West Virginia Pulp and Paper Company using the first all-electronic speed matching system ever to be installed.

The No. 2 machine at this mill is one of three equipped with sectional electric drive. During a two week shutdown for general overhauling of the machine, the drive was modified to include the all-electronic regulating system. Alterations in the machine were made with a view toward higher operating speeds, and the electronic regulators were added to permit of improved draw regulation at these higher speeds. As a result of this modernization, production has been stepped up more than 10 per cent; sheet formation is better, and over-all operation of the entire machine has been markedly improved.

It is interesting to note the speed with which the machine was put into production following the shutdown. Although it was possible to make certain initial adjustments on the drive prior to start-up, final adjustments had to wait until a sheet was put across the machine. Just twenty minutes transpired from the time stock was put on the wire until a salable sheet was on the reel. In this short period, final adjustments were made on the seven electronic regulators involved, and all draws were set at the required values. From this initial start-up the machine continued in production and operating results to date indicate negligible down time attributed to the electrical equipment.

As indicated, the electronic system is applicable to paper machine drives of the sectional electric type. Such a drive consists of individual motors applied to each section of the machine requiring independent draw control. Present forms of this type of drive include (1) the single generator system and (2) the multiple generator system. In the single generator system, one generator supplies power to all section drive motors. A separate momentarily-rated generator, usually considerably smaller than the main unit, is included for starting and accelerating service and for inching the various sections to facilitate making wire or clothing changes, to supply driving power to a section during wash-up periods and to clear calender plugs on reverse voltage. The multiple generator system consists of individual power supplying generators for each section motor and suitable control for each generator. The regulating systems are essentially the same for each type of drive except that regulation is obtained by controlling the excitations of the individual generator fields on the multiple generator system instead of the motor shunt fields as is done on the single generator system. Somewhat improved performance is inherent in the multiple generator system since regulation of motor speed by armature voltage control, instead of shunt field control, affords greater stability over a wider operating speed range.

The development of the sectional paper machine speed regulator is the outgrowth of the trend toward higher operating speeds and the wider use of this form of paper machine drive. Initial work on the electronic regulator was started prior to the recent war. The merits of electronic regu-

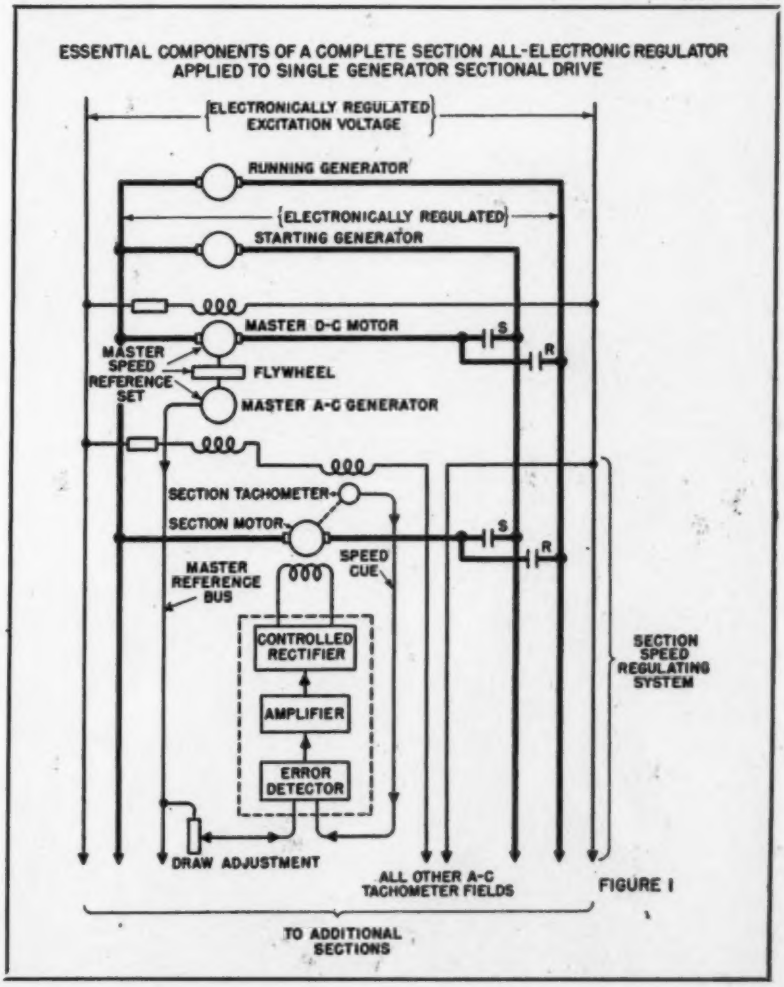
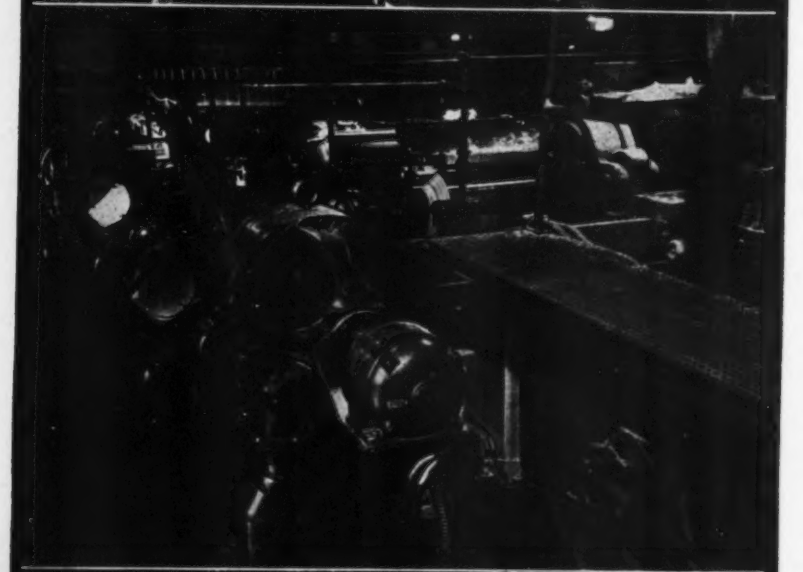
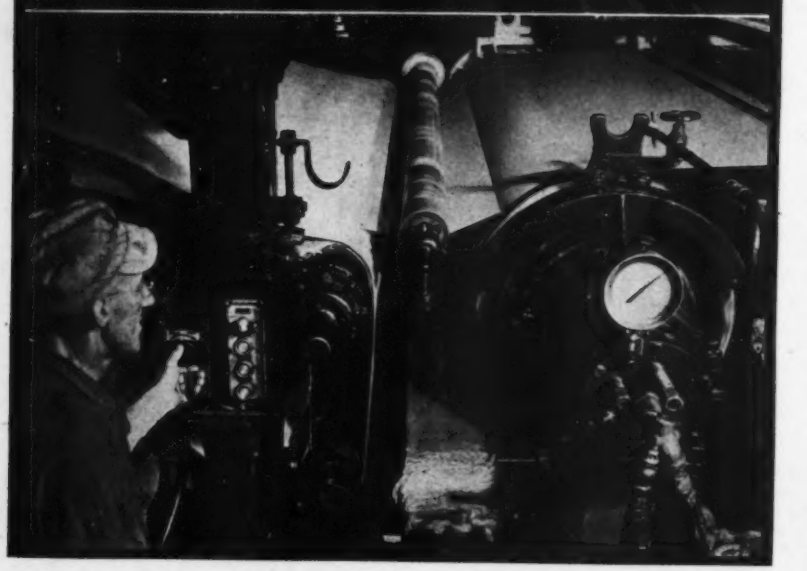


FIGURE I





lators for paper mill drives long had been demonstrated by the excellent service records of electronic voltage regulators used with sectional drive and of electronic speed regulators applied to single motor drives as early as the year 1932. In view of these and other highly satisfactory applications of electronics in industry, it was natural that electronics be considered in the improvement of the earlier forms of section speed matching regulators such as the rotary contactor type and the carbon pile type, for many years the standard. Moreover, the requirements for extremely quick response, the aim for simplicity of over-all design and the availability of time-tested electronic components led to the development of an all-electronic system. In this electronic regulating system no rotating d-c machines with their attendant commutator and brush problems are used. The only moving parts are the rugged inductor type a-c tachometer generators driven from each section drive to furnish the required cue of section operating speed.

Although the rotary contactor and the carbon pile types of regulators were primarily position regulators, analysis and field tests indicated that regulation of speed alone was feasible. Inasmuch as speed regulators offer distinct advantage over position regulators, development work was directed along these lines. With a speed regulator, the methods required to obtain draw control are greatly simplified. Quicker response can be obtained and a speed regulated system is much easier to stabilize. The new all-electronic system is, therefore, fundamentally one for speed regulation rather than position regulation. Incidentally, the accuracies required of such a speed regulating device can

Fig. 2 (above)—Close-up view of drive equipment for the couch section of the revamped No. 2 machine. Note the rugged totally-enclosed construction of the small a-c tachometer generator forming part of the section speed matching system and driven from a shaft extension of the main drive motor. Beyond the main motor is the section speed reducer direct-connected to the couch intake shaft. The couch roll and adjacent press felt may be seen in the upper right

Fig. 3 (center)—View looking back toward the fourdrinier section of the machine. The drive motors for the first, second, and smoothing press sections together with their associated speed indicating tachometer generators may be seen

Fig. 4 (below)—Machine tender adjusting the draw at the couch section of the revamped machine. The small draw adjusting rheostat with vernier dial, shown mounted in a separate splashproof enclosure, may be made an integral part of the pushbutton control station assembly

be approached at present only by electronic means.

The essential components of a complete section regulator on a typical single generator sectional drive are shown schematically in Figure 1. A rotating master reference m-g set provides a master speed reference to which the speed of each individual section is matched. Such a master reference m-g set includes a small inductor type a-c generator for furnishing a master reference signal to each section regulator; a small d-c motor that receives armature power from the same generator that furnishes power to all section drive units; and, a flywheel to match the inertia characteristics of the m-g set to those of the highest inertia section on the paper machine. This affords improved system performance during transient disturbances and while making changes in machine speed. The master speed reference may also take the form of a statically regulated a-c supply including the equivalent features of the rotating master m-g set such as matched inertia characteristics, complete independence from all machine sections, and easy adjustability over the operating speed range of the paper machine.

Indication of section operating speed is obtained from a small a-c tachometer generator driven from each section drive. These section tachometers are duplicates of the unit used on the rotating master m-g set. Figure 2 shows the drive equipment for the couch section including the main drive motor, a right angle speed reducer and the section tachometer driven from a shaft extension of the main motor. Figure 3 is a general view of the drive equipment on the press sections showing their individual tachometers. On new drives, it is common practice to drive the tachometers from high speed shaft extensions of the various section speed reducers associated with each main drive motor. This location releases valuable aisle space and passageway areas facilitating maintenance and service work in back of the machine.

Over-all operation of a typical section regulator is relatively simple. An a-c voltage signal from the master generator and a similar signal from the section tachometer are each fed into the error-detecting element of the electronic regulator. The system is adjusted for a balance between these two voltages when the section is running at its nominal operating speed. Under these conditions, the grid-controlled thyratron rectifier supplies the required excitation to the section motor shunt field to cause the motor to operate at this nominal speed.

ESSENTIAL COMPONENTS OF A COMPLETE SECTION ALL-ELECTRONIC REGULATOR APPLIED TO MULTIPLE GENERATOR SECTIONAL DRIVE

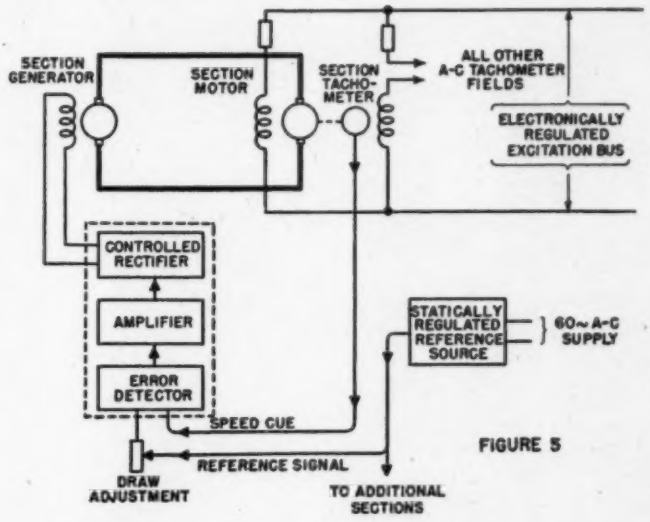


FIGURE 5

Assuming the section to be running and the regulating system to be in correct balance, the slightest decrease in section motor speed, resulting from, say, a slight increase in load, is detected by the appearance of an error voltage approximately proportional to the difference between the voltage signals from the reference and the section speed cue. This error voltage, which has the proper sense to identify the direction of speed change, is amplified and serves to decrease the output of the controlled rectifier. The shunt field of the section motor being regulated is thus weakened permitting it to assume the increased load with no appreciable decrease in speed. Corrective action is initiated instantaneously and both transient and steady-state errors are held to a minimum. Any tendency of the section motor to speed up results in an error voltage of opposite sense and causes the reverse sequence of events to occur. The error voltage is not only proportional to the magnitude of the speed change but is also proportional to the rate at which the speed is changing. Consequently, depending upon the rate of change of speed, powerful corrective action is initiated long before the actual speed has had time to change appreciably. Large speed changes due to sudden disturbances are, therefore, prevented.

Since the speed of each section is matched to the speed of the master m-g set to a high degree of accuracy, the speed relation between adjacent sections is held within very close limits. Accurately maintained speed relations between sections result in extremely uniform draws throughout the machine. Field tests indicate that steady-state accuracies better than ± 0.05 per cent are being obtained consistently. Moreover, system operation at this high level of regulator performance is possible under very stable conditions of regulation. These highly satisfactory operating results are due largely to certain added features incorporated into the regulator design.

To obtain the high degree of accuracy necessary in this type of application and the quick response required to cope with transient disturbances on the system, the regulator must be made extremely sensitive to change. Stable operation under all conditions with high regulator sensitivity requires the use of antihunting features either in the form of field forcing (anticipation) or system damping (negative feedback). The all-electronic section regulators include both. When each regulator is properly adjusted to match the characteristics of the machine section to which it is applied, there is no tendency for an individual section or the machine as a whole to oscillate or hunt following some abnormal disturbance. Swinging is held well below the permissible minimum when a section is put under regulation and when unusual demands are placed on the regulators due to large load changes or during rapid productive speed changes.

The initial adjustments required on each regulator are simple and permanent. Once the antihunting char-

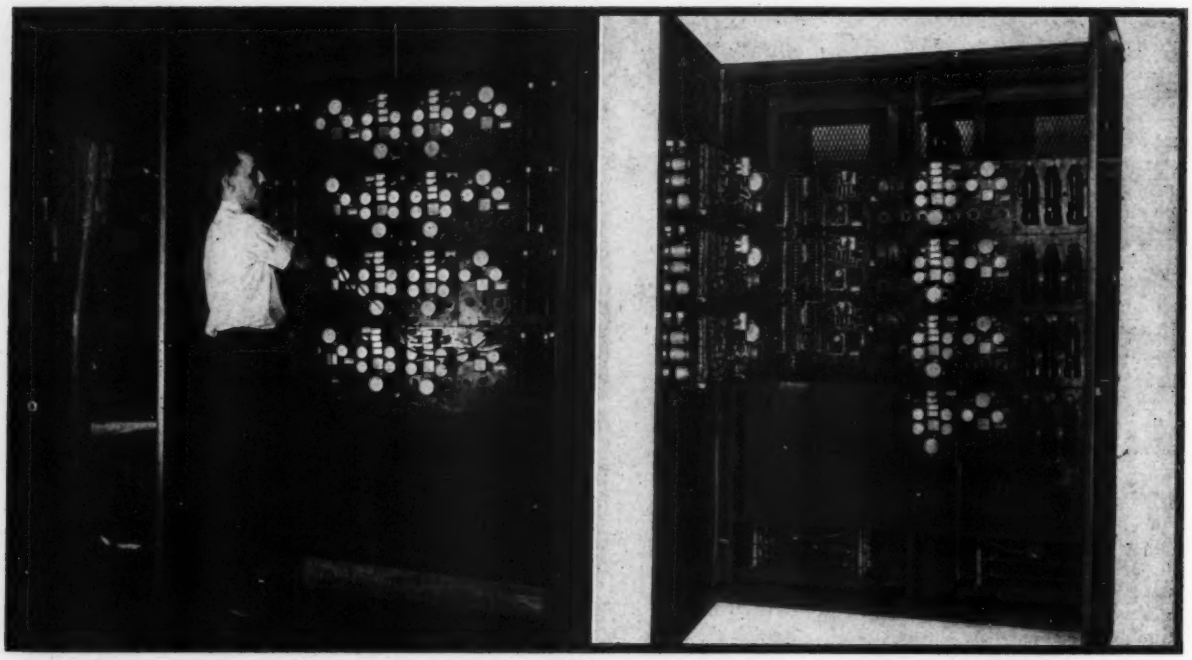


Fig. 6 (left)—Complete assembly of seven section regulators and one spare unit all housed in a single cubicle for rapid check and maintenance. Note the sectionalized arrangement of the individual regulator assembly with the error-deleting element, the amplifier panel and the grid-controlled thyraton rectifier panel mounted on a hinged framework held in place by two thumb screws. Temperature control resistors and spare plug-in cables can be seen at the bottom. . . . Fig. 7 (right)—Front view of a complete paper machine regulator assembly showing the electronic components of seven separate section units. The hinged-panel construction of each individual regulator permits ready accessibility to all internal wiring, associated circuit components, and external connections. The plug-in connections to each unit sub-assembly facilitates quick removal of a faulty unit and replacement of all or a portion of a complete spare unit, thus insuring continuity of service with minimum down time

acteristics of a regulator have been adjusted to meet the requirements of a particular section, no subsequent care or change is necessary. Small potentiometers located on the regulator panel serve this purpose. Thus, no frequent check or periodic maintenance is necessary to insure continuity of service with optimum performance.

Draw adjustment is obtained by altering the magnitude of the reference signal voltage that is fed into the error detector element. Decreasing this input voltage will cause the associated section motor to slow down until the voltage signal from the speed cue again matches the new reference voltage. A balance is again established and a tighter draw results between the section where the draw was changed and the preceding section. Since the currents flowing in the reference and speed cue circuits are small, the draw adjusting rheostats are also small. They can be conveniently mounted on the tending side of the machine and, being small, can be made a part of the operators' push-button control stations. The operator in Figure 4 is seen to be making a draw adjustment at the couch. The draw rheostat is housed separately on this revamped installation. Fine adjustment of draw is possible through use of a vernier type of rheostat dial.

Great care has been exercised in the fundamental design of the entire electronic system. The use of a high frequency a-c tachometer generator to provide section speed indication together with isolating transformers precludes possible troubles resulting from leakage currents and stray magnetic fields in and around the long conduit runs from the section drive location to the regulator cubicle. The impedances of the electronic circuits themselves are kept as low as possible for similar reasons. All circuit components are of the highest quality and are conservatively applied. Reliability under adverse mill conditions has been stressed throughout the whole development.

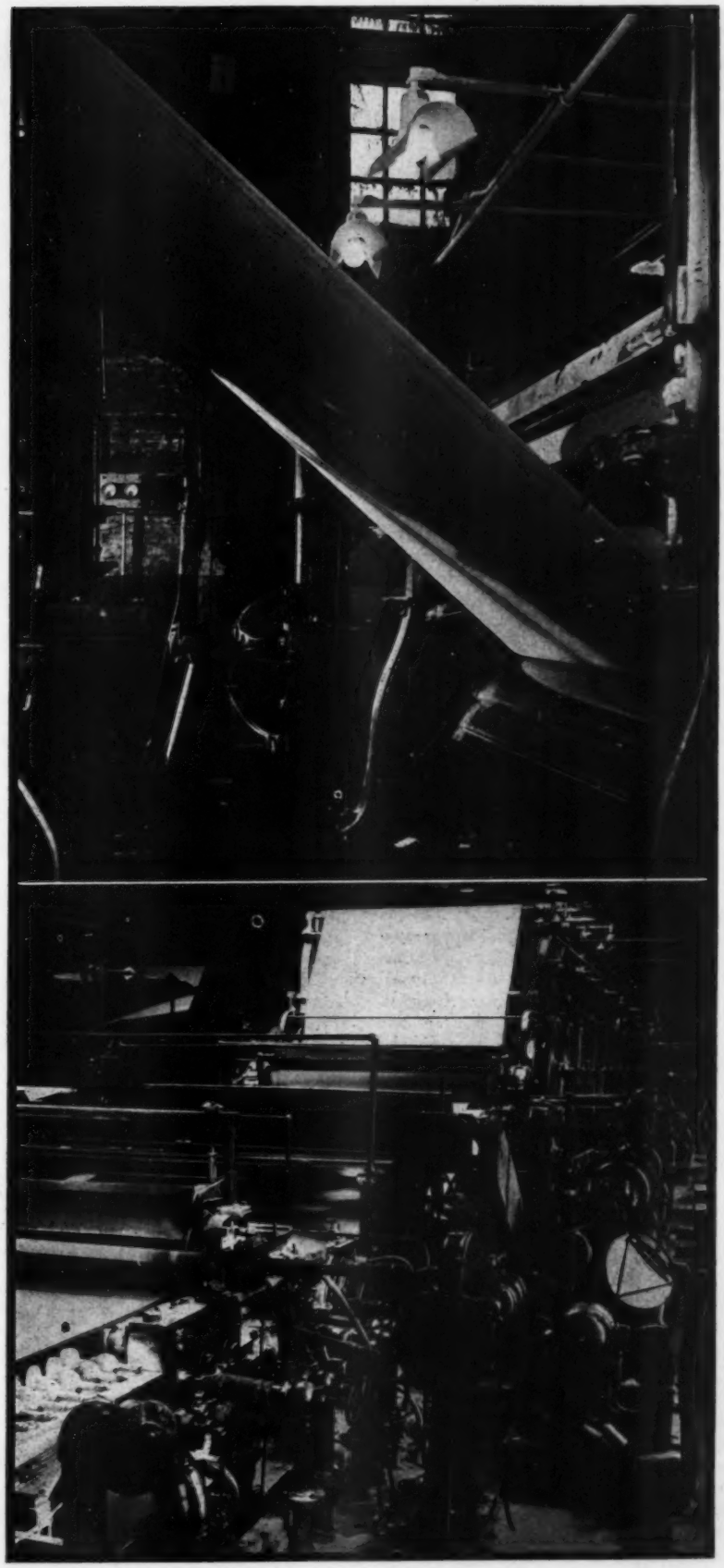
A novel arrangement employing the thermal time lag of a vacuum tube is used to put a given section under regulation upon starting. Former practice on single generator systems brought the section regulator into service suddenly and with an abrupt shock to the system at the time of transfer from the starting to the running generator. The section motor field was abnormally weakened, high armature currents flowed and initial hunting was unduly aggravated. With the new all-electronic system, the thermal timelag of a vacuum tube brings the regulator into service with absolutely no shock. In fact, the cushioning action is so effective that it is difficult to tell when a section goes under regulation. On high inertia sections the normal thermal lag of the tube is lengthened to further reduce the possibility of a major disturbance to the system.

Figure 5 shows the schematic arrangement of the all-electronic speed matching regulators as applied to the multiple generator type of sectional drive. Here the output of the controlled rectifier supplies the excitation requirements of the generator furnishing power exclusively to a section motor. Aside from the reverse sense of the regulator to speed change (a decrease in speed will increase the rectifier output), both systems are identical. Instead of the rotating master m-g set, the statically regulated a-c supply is shown. Either type of reference is applicable to both the single and the multiple types of sectional drive.

Present designs of the all-electronic system for single generator sectional drives have all section regulators mounted in one cubicle as shown in Figure 6. Certain advantages are apparent with this arrangement. The central location permits quicker checking and maintenance of all regulators.

Fig. 8 (above)—The section drive motor with the associated a-c tachometer generator for the first calender section may be seen in this view between calenders. The overhung mounting of the tachometer precludes the necessity of a special foundation

Fig. 9 (below)—General view of the drive side of machine looking from the fourdrinier toward the dry end. The small tachometer generator driven by the section motor in the right foreground measures the speed of the couch and, through the all-electronic speed matching system, initiates powerful corrective forces to hold this section in exact speed relation with the rest of the machine. A total of eight section drive equipments are visible, seven of which are similarly equipped with speed matching regulators



To provide the ultimate in continuity of service, the cubicle includes a complete spare regulator (less certain rugged transformer components). Since all external connections to each regulator are made with plug-in cables, a faulty unit may be removed from service and the spare unit substituted in a matter of seconds. Spare plug-in cables may be seen in the bottom center of the cubicle. Moreover, each regulator is sectionalized to permit the removal or replacement of all or only a portion of a given regulator. The cubicle is self-contained and includes all necessary thyratron anode transformers, protective circuit breakers, sequencing relays and auxiliary components. Hinged doors with locking facilities insure against unauthorized tampering.

The three major components of each regulator are mounted on an individual hinged framework which allows the complete assembly to be swung out as shown in Figure 7. This arrangement gives quick and easy access to all internal wiring and associated components for on-the-spot maintenance. For more thorough checking the whole framework may be removed by removing the hinge pins.

Continued optimum performance of this new all-electronic system is not contingent upon frequent or off-hour maintenance. No delicate mechanical adjustments are necessary; all initial adjustments, when once made, will remain unchanged throughout the life of the equipment. Erratic operation resulting from variable brush drop are eliminated through use of the a-c tachometer. Maintenance consists largely of a periodic check on the electronic tubes. The thyratron tubes in the controlled rectifier need be replaced only upon failure, since failure of any one thyratron in a section regulator will not interrupt operation.

(Turn to page 994)

Improvements in the Couching and Pressing of Sheets for Pulp Testing

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▶▶▶ SINCE THE STANDARD TAPPI or British sheet-making method was devised (*1*), there have been two features of the equipment and method which, while giving satisfactory results, were not very convenient. These were couching by means of the heavy roll and the attention required for the two pressing operations.

As a result of trials made during the past year, it would appear the drawbacks incidental to these two operations can be eliminated. The manipulative skill required is considerably reduced, and the two main opportunities for carelessness on the part of the operator to influence the results are removed. Thus the method becomes especially well adapted to control work.

Routine Control Tests

There has been an occasional objection in the past to the standard TAPPI method and equipment for routine control work because of the time consumed. Any extra time is used not in forming the sheets, which is practically the same for any equipment, but in the relatively more elaborate couching and pressing procedures prescribed. However, it has been shown by careful work (*2*) that all the provisions are necessary for precise and reproducible results with almost any sheet forming method.

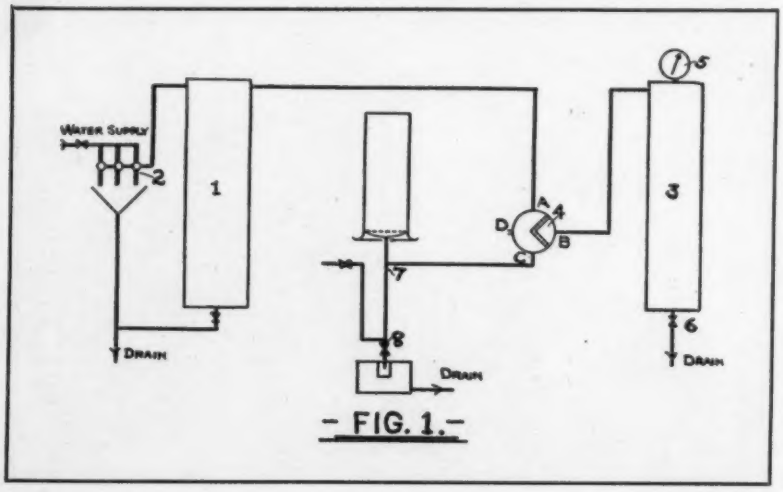
Despite the slightly longer time required for making and pressing test sheets in strict accordance with the present method, as against using short cuts or some other method, it is not always appreciated that the reproducibility of the TAPPI standard test sheets is such that fewer test sheets need be made *and tested* to secure a given degree of precision. It always saves over-all time to make *and test* better, and thus fewer, sheets.

Also, there is another time saver and improvement that is becoming clear to users of the standard equipment, namely, that the drainage time of the stock, secured merely by noting its temperature in the cylinder and the time it requires to drain, constitutes an excellent measure of its slowness or wetness. This measurement is believed to give a much more reliable indication of the behavior of the stock on the paper machine wire than the usual freeness test; moreover, the considerable time, the additional pulp, the equipment and the effort entailed in making separate freeness tests is saved.

Influence on Test Results

With the improvements to be described in this article, there should remain no incentive for making any short cuts whatever in the standard method. Also, the precision of the method, especially with an inexperienced operator, will be enhanced.

The control equipment for the pressing operation, which was designed by Herbert T. Peterson of the Pulp Division, Weyerhaeuser Timber Company, operates in strict accordance with the existing standard procedure.



- FIG. 1.-

The new couching method suggested will cause a very slight change in the results, giving tests which may be as much as two or three per cent lower than the standard procedure for unbeaten stock and perhaps two or three per cent higher for very well beaten stock. Therefore this change must be recognized as constituting a slight deviation from standard and not employed for referee work until and unless it receives official approval. However, for all practical purposes, the small changes resulting will be negligible, especially in view of the marked advantages to be gained.

VACUUM COUCHING

Vacuum couching of laboratory handsheets appears to be a fairly recent development. It is believed that it was first put into practice by William Nash of Menasha, Wisconsin, about 1940, on a special machine. It was shortly thereafter tried by the author for removing very thin handsheets from a large mould and found to be greatly superior to roll couching for this purpose. Subsequently, it was adopted for this specific purpose by the Institute of Paper Chemistry.

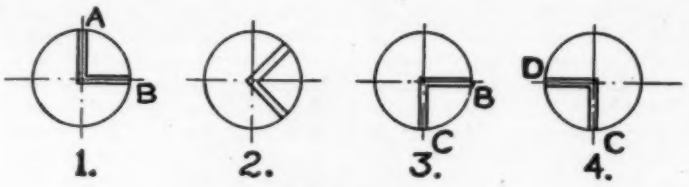
Through the courtesy of the Pulp Division of the Weyerhaeuser Timber Company, the necessary apparatus was added to a standard TAPPI sheet machine and the following description and test results were made possible.

Apparatus

A diagram of the apparatus is shown in Figure 1. It consists of a vacuum accumulator tank (1), having a capacity of about two cubic feet, which is exhausted continuously by three water-operated laboratory vacuum pumps (2). These pumps and tank may be replaced by a motor-operated air compressor and tank of the type commonly used for small automobile filling stations, the pump being connected so as to exhaust instead of compress the air in the tank.

Tank 1 is connected through a 4-way plug cock (4) to a vacuum reservoir tank (3) of one cubic foot capacity. This tank is conveniently made from a piece of 8-inch pipe, 34 inches long. A vacuum gauge (5) is connected to the top of the tank and a drain and cock (6) is provided at the bottom.

The four-way cock (4) is connect-



- FIG. 2. -

ed to the ⅛-inch tapped hole in place of the existing petcock in the drainage leg (7) of the sheet machine. The length and diameter of the pipe from the drainage leg (7) through the cock (4) to the tank (3) should be fixed. Nine feet of ⅛-inch I.D. copper tubing is suggested.

The cock (4) is connected to the equipment as shown, orifice or way (D) being open to the atmosphere. The four working positions of plug-cock (4) are shown in Figure 2. In position 2, all connections are closed.

Procedure

The method of operation is as follows: Tank (3) is connected to accumulator (1) . . . (cock position 1) until gauge (5) registers 15±0.5 inches of mercury. If desired, this may be insured by means of a vacuum relief valve attached to tank (3) and set at 15 inches of vacuum. When the desired vacuum is reached, cock (4) is moved to position 2.

The stock for the test sheet is added to the cylinder, stirred and drained as usual. When the sheet has drained, the sheet machine cylinder is unlatched and opened. From this point the procedure is changed from standard. Instead of using two square dry blotters for couching with the roll, a single round sheet of standard blotter, cut 7¼ inches in diameter, is dipped into a pan of water and thoroughly wetted. The circle of blotter is removed from the pan, wiped across the edge to prevent dripping, then laid centrally over the wet test sheet, the face of the blotter in contact with the test sheet being the smooth or wire side. As the diameter of the blotter is the same as the outer diameter of the sheet machine at that place, centering of the wet blotter is an easy matter. A gentle circular wipe with the fingers is given the top surface of the blotter to place it in smooth contact with the outer edge of the wire grid plate and sheet machine rim.

Drainage valve (8) (on the sheet machine) is closed and cock (4) is moved into position 3, connecting tank (3) to the underside of the sheet. When the vacuum has been applied for 10± seconds, cock (4) is moved into position 4, thus releasing the vacuum beneath the sheet. One, ±0.2 second after moving cock to position 4, an edge of the couch blotter meanwhile being gripped with the thumb and forefinger of the left hand, the blotter and test sheet are couched off the wire in the usual manner.

The combination is laid, test sheet uppermost, on a single dry square sheet of standard blotter in the press, then centered by means of the press template and covered with a polished steel drying plate as usual. The plate is covered with another square dry blotter in readiness for the next test sheet and couch blotter. Cock (4) is *quickly* moved back, counterclockwise, to position 1. The vacuum in tank (3) is adjusted and the next sheet is made.

EXPERIMENTAL

The following data, obtained by George Robbins of the Research Department, Pulp Division, Weyerhaeuser Timber Company, indicate the result of the suggested change in procedure:

Experiment A—Influence of Duration of Vacuum

A 15-inch vacuum was chosen because a high vacuum works well but a vacuum higher than 15 inches would not be easy to obtain with simple equipment. Using a very wet beaten sulphite pulp having a drainage time of 43 seconds, a standard sheet was made and couched one second after the vacuum had been applied for the various times shown. The wet sheet was peeled off the couch blotter and weighed.

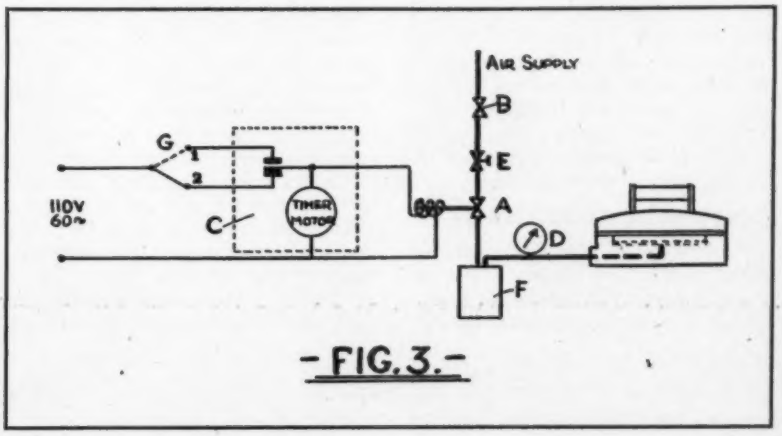
Duration of Vacuum (Seconds)	Wet Weight of Sheet (Grams)
25	6.7
15	6.9
10	7.5
7.5	7.7
5	8.0

During the time the vacuum is applied, the moisture at the edge of the blotter migrates toward the center and is removed through the small annular opening between the rim of the grid plate and the sheet machine. From observation, it appears that over five seconds is required for most of the free water to disappear, and from the data, ten seconds seems to be a reasonable compromise between constancy of weight and time consumed.

Experiment B—Influence of Time between Vacuum Release and Couching

When the vacuum is released, water drawn away from the sheet and blotter into the wire and gridplate, returns rapidly and its distribution depends to some degree on the nature of the test sheet. Test sheets from wet beaten sulphite, as for Experiment A, and from a sample of unbeaten, unbleached raw kraft from Douglas fir, were made and couched at different times after the vacuum was released.

Interval before Couching (Seconds)	Wet Weight of Beaten Sulphite (Grams)	Wet Weight of Raw Kraft (Grams)
1	7.6	Not determined
2	8.7	5.6
4	10.0	5.8
9	11.6	5.9



- FIG. 3. -

These figures show that there is a rapid regain of the moisture in the test sheets especially of well beaten stock. Because the texture of the kraft sheets was coarser than the blotters, more of the returned water passed into the latter.

Experiment C—Comparison of Couching Methods

A sample of Douglas fir bleached sulphate was beaten in a 1½ lb. Valley beater for various times. Standard 1.2 gram (dry weight) sheets were roll couched by the standard method with two blotters and by the vacuum procedure with a single blotter. The sheets were peeled off the blotters after couching and weighed.

Beating Time (Minutes)	Wet Weight Roll Couched (Grams)	Wet Weight Vacuum Couched (Grams)	
0	3.8	6.5,	6.4
30	4.4	6.4,	6.2
60	7.6	6.5,	6.2
80	10.0	6.4,	6.6

The figures given are for individual sheets. They indicate that as beating proceeds, the sheets become moister with the standard method but remain about the same with vacuum couching.

Experiment D—Comparison of Couching Methods

A sample of western hemlock was tested under the same procedure as Experiment C.

Beating Time (Minutes)	Wet Weight Roll Couched (Grams)	Wet Weight Vacuum Couched (Grams)
0	3.5	5.7
20	3.9	5.4
40	4.0	5.5
80	7.2	5.4
100	8.4	5.6

It will be seen that in both experiments the moisture in the sheet remained fairly constant by the vacuum method and increased with the roll method.

Changes in the moisture content of the sheets (and blotters) placed in the press for the first pressing will cause only small changes in the results (2). This has been confirmed by actual comparative tests, the burst and tensile results being decreased slightly for unbeaten pulp and increased very slightly for well beaten pulp. This influence on the tearing strength is, as usual, in the opposite direction.

AUTOMATIC PRESS CONTROL

A diagram of the apparatus required is shown in Figure 3. The air is supplied from any convenient source having a minimum pressure of over 60 psi. The pump for the press is not used and the press is emptied of glycerine. The press is connected to gauge (D) and the air supply through a small air tank (F) having a capacity of about 1/10 cubic foot, a Taylor Instrument Company Non-lock-in type Electro-pneumatic Pilot Valve (A), a Hoke ⅛-inch needle valve (E), a Taylor Instrument air pressure reducing valve (B), and a suitable air strainer. When the Taylor valve is opened, the air pressure under the diaphragm of the press builds up at a rate dependent on the needle valve opening, the air pressure (controlled by B to 50 psi) and the volume in the air system beyond valve (E). If the air tank were not used, the valve opening of E would have to be set so exceedingly small (equivalent to an orifice 0.006 inch diameter) that trouble with plugging would be invited. With the system as shown, the needle valve can be opened a reasonable distance.

A 110-volt a-c supply is connected through a single pole double throw (three-way) switch (G) to a General Electric Company Model 3TSA14 Timer switch with an 8-minute cycle (C) to the Taylor valve (A). The G. E. timer has two contacts with a setting device enabling the 8-minute cycle to be divided between these two contacts for any desired proportion of the time, the circuit being opened at the end of each period. For present purposes, one of the contact circuits (1) is set to remain closed for 68¾ per cent of the cycle; i.e., 5½ minutes, so that the other contact (circuit 2) will close for the remaining time, 2½ minutes, then open.

When switch (G) is thrown to position 1, the timer motor will keep circuit 1 closed, so opening valve (A), for 5½ minutes. When the Taylor valve closes, it not only shuts off the air supply but also allows the air pressure beyond it and beneath the press to exhaust to atmosphere. To complete the second pressing cycle, the switch (G) is thrown to position 2, when valve (A) will open again and, after 2½ minutes, will close and release the air pressure on the press. The contacts are then in their original position and the timer is ready for the next 5½ minute cycle.

In operation, the stack of sheets and blotters are built up in the press for the first pressing, the cover placed in position and secured with two nuts, which are sufficient when placed diagonally. The switch is thrown to position 1 when the pressure builds up uniformly to 50 psi in 30 seconds, is maintained there for 5 minutes, then released. For the second pressing, the test sheets are restacked and the switch thrown to position 2, when the pressure builds up again to 50 psi in 30 seconds, is kept at 50 psi for two minutes as specified, then is released.

It will be seen that the only difference between the automatic and the standard operation is the fact that the rate of build-up of the 50 psi for the second pressing is 30 seconds instead of a shorter but unspecified time. However, experiments (2) have shown that this will not have any perceptible effect on the results.

If signal lights are desired to indicate the duration of each pressing and to establish its identity, a double pole double throw switch may be used. One pole is connected as shown in Figure 3 and the second pole connected to one end of the Taylor valve coil and the second contacts connected to two signal lamps. The other terminals of the lamps are connected together to the other end of the valve coil.

If a G. E. timer as specified is not procurable, two ordinary electric time switches may be used in place of it, one in circuit (1) set for 5½ minutes, and another in circuit (2) set for 2½ minutes. Alternatively, a single time switch with variable settings may be employed in a single circuit, but with either substitute, especially the latter, mistakes in timing the press operation are invited.

Literature References

1) Clark, James d'A., *Proc. Tech. Section,* Papermakers' Association, Great Britain and Ireland. VII, Part 2, 1927, pp. 242-249.

2) *Interim Report of the Pulp Evaluation Committee,* Vol. 1, P.M.A. of G.B. & I., London 1929, 127 pp.

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Sectional Paper Machine Output Increased with Electronic Regulator

(Continued from page 991)

This discussion is based entirely on operating results on a machine that has been in production for some time. From the existing facts it is concluded that additional field data now being collected will validate all claims made for this new regulator. In short, substantial improvement in paper machine performance is assured with sectional electric drive equipped with the all-electronic system of section speed matching.

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Draper's

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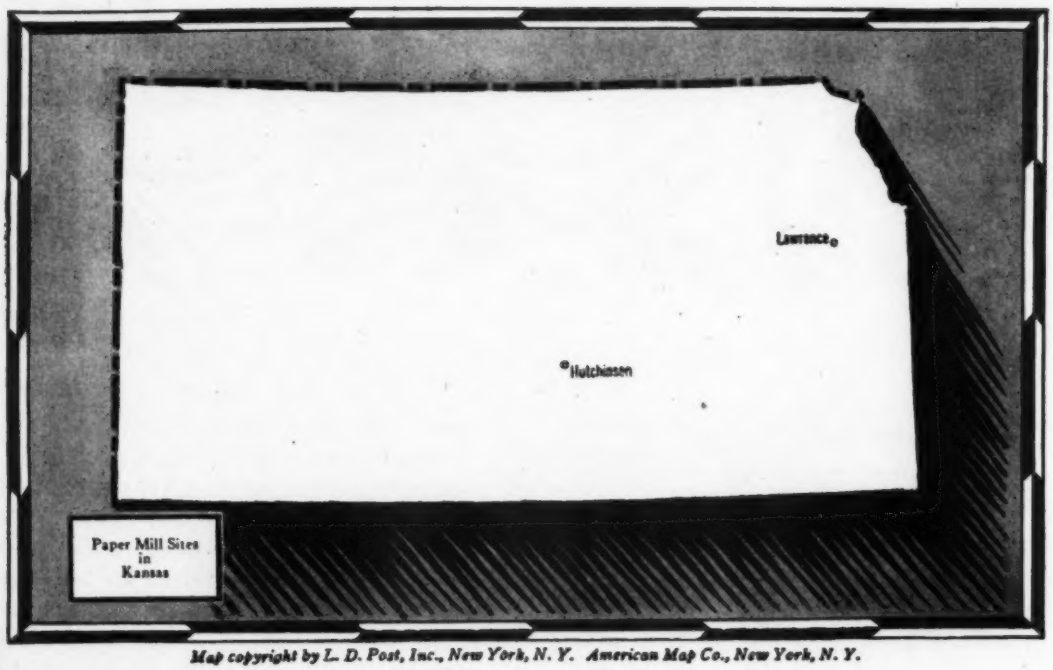

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HIGHLIGHTS: Kansas was not designed by nature for papermaking. It grows no woods suitable for pulp; it consists largely of rolling prairie land offering poor opportunity for water-power. It does produce some coal and natural gas. Its only native fibrous products adaptable to papermaking are oat and rye straw. If cornstalks ever become economically practical, the large annual crop in Kansas will be available.

At present the rated daily capacity of the two paper mills in the State is only 300,000 pounds. The largest of these plants makes chip board, egg case board, filled news board and straw board on one four-cylinder and one seven-cylinder machine. The other, on one six-cylinder machine, produces 30 tons daily of jute liners for corrugating and corrugated shipping containers.

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Wood Chemistry Topic of Appleton TAPPI Meeting

▶▶▶ FOLLOWING THE PATTERN set in 1946, regional TAPPI meetings are being held this fall instead of a single general meeting as had been customary in prewar years. The first of these five regional meetings, scheduled for the fall of 1947, was held September 3-5 at The Institute of Paper Chemistry, Appleton, Wisconsin. This meeting, sponsored by the TAPPI Committee on Fundamental Research, attracted a large delegation of eminent chemists, not only from all parts of the United States, but some from Canada and even one from Australia. Under the enthusiastic leadership of Dr. Harry F. Lewis, chairman of the committee, an interesting and stimulating program was presented.

The theme of the program, "The Nature of the Chemical Components of Wood," introduced a subject of wide interest to the pulp and paper industry. Parallel programs were run throughout the three days of the meeting, one dealing with the polysaccharide constituents of wood and the other with lignin and the extraneous components of wood.

At the opening session of the meeting on Wednesday morning, Dr. Lewis introduced W. F. Gillespie, president of TAPPI, who welcomed the many guests present. Mr. Gillespie paid tribute to the late Worthen E. Brawn, whose untimely death has been a great loss to the organization. Dr. Westbrook Steele, executive director of The Institute of Paper Chemistry, then welcomed the TAPPI members as guests of the Institute.

Dr. Lewis, in his opening address said: "This meeting is in a very real sense a continuation of the 1946 meeting (Detroit) which dealt with the whole subject of pulpwood availability, procurement, and utilization." He pointed out the increasing costs of pulp production arising from the necessity of procuring wood from great distances or using lower quality materials which may be close at hand. Since a remedy for this is difficult, an approach to the problem might be made by attempting to decrease over-all costs of production by increasing pulp yield, by improving pulp quality, or by better utilization of by-products of the industry.

Higher pulp yields, along with greatly improved quality, have been obtained experimentally in the laboratory through the preparation of holocellulose—the fibrous entity of the wood exclusive of lignin and extraneous materials—either by chlorination and extraction with alkalized organic solvents or by the use of acidified sodium chlorite. Higher yield pulps have also been obtained and are being produced commercially on a limited scale by means of a semichemical pulping process using a mild delignification. Peroxide bleaching of groundwood extends the usefulness of this high yield material into products for which it was formerly considered unsuitable. These processes have not been applied very extensively in pulp manufacture. The improvement of pulp quality at a lower cost would be more difficult. More extensive utilization of the "noncarbohydrate" components of the wood should be considered. One of the greatest problems is the utilization of lignin; much of this material is now treated as a waste material or is used for fuel. The pulp and paper industry has a definite responsibility to the leather industry for the continuance of the supply of tanning materials, inasmuch as these are becoming increasingly scarce. In the South, the recovery of resinous by-products from pulp mills has greatly enhanced the supply of naval stores. Not only the major constituents of wood are important in pulp manufacture, but Holger Erdtman has shown that minor ones may well be responsible for the difficulties encountered in sulphite pulping of wood. Coloring matters occurring in the wood may play their role in the production of a good or an inferior pulp.

That fundamental knowledge is still lacking in the fields of cellulose, the hemicelluloses, lignin, gums, mucilages, and pectins, was stressed by Dr. Lewis. This lack and a need for concentrated effort in attempting to solve some of these problems were recognized by the Committee on Fundamental Research. Therefore, the purpose of this meeting was to attempt to inaugurate a program of coordinated research by pointing out those areas in these fields where fundamental research is particularly needed.

"Unsolved Cellulose Problems"

Dr. Herman Mark, of the Polytechnic Institute of Brooklyn, was the chairman of the session on cellulose and carbohydrate problems. It was very fitting indeed that Dr. Mark, who has been closely associated with Dr. Emil Heuser in this field, should introduce him as the principal speaker of this meeting. It was further very appropriate that this paper, "Unsolved Cellulose Problems," should be given by Dr. Heuser who has long been an active worker in the field of cellulose chemistry. He very ably traced the development of cellulose research and reviewed the difficulties encountered by workers in the field, many of which still remain unsolved today. He outlined the problems for discussion as those dealing with (1) details of individual chain structure of cellulose, further divided for purposes of discussion to include the questions of the presence and distribution of weak linkages in native cellulose, the existence and introduction of linkages across the chain, the relative reactivity of the different hydroxyl groups, and the molecular weight and weight distribution; (2) behavior of cellulose in solution; and (3) behavior in the solid state.

Progress in Hemicelluloses

The unfortunate illness of Dr. Louis E. Wise, whose work in the hemicellulose field is well known, prevented his attendance at the meetings. However, in his absence, Dr. W. Ward Pigman read a paper which had been prepared by Dr. Wise for this meeting. It gave a brief resumé of the work which has been done by various investigators in regard to the hemicelluloses and pointed out the very great need for truly fundamental studies. Dr. Wise outlined areas in which such fundamental research should be done. These include studies on chain-length distribution, on structure of products of partial hydrolysis and the molecular weight of derivatives, on the nature

of the lignin-carbohydrate complex in wood, the constitution of alpha-cellulose of hardwoods and softwoods, correlation of type and amount of hemicelluloses with properties of pulp, types of sugar derivatives obtained in sulphite and sulphate cooks, methylation studies, X-ray studies on residual pulp after partial and complete removal of the hemicelluloses, the industrial utilization of the hemicelluloses, improvement in the analytical methods for determining mannose, and changes brought about in the nature of the holocellulose by the attack of micro-organisms on wood. To this list Dr. Pigman added the need for the improvement of methods of separation and isolation of the hemicelluloses.

The group discussion which followed, under the direction of G. J. Ritter, of the Forest Products Laboratory, indicated that not only was it agreed that the problems as pointed out by Dr. Wise and Dr. Pigman were the ones which needed consideration, but that, also, very little information was available and that an insufficient amount of fundamental work had been done in most of these fields.

Dr. Ritter made an interesting contribution to this discussion when he discussed work done at the Forest Products Laboratory in which studies on the crystalline structure of wood fibers were made. The crystalline growth of the fibers was followed by X-ray studies. Samples of fibers of the same age were obtained by careful sectioning technique; X-ray diagrams of these fibers indicated that the very first fibers were amorphous and that crystallization progressed until the fibers were twelve days old, after which the X-ray diagram showed no further change.

"Gums and Mucilages"

A very interesting paper, "Gums and Mucilages," was presented by E. V. White, of the University of Idaho. This paper, giving the results of painstaking and tedious work, together with Mr. White's directness of manner and vibrant personality, captivated the interest of the audience completely. Mr. White discussed the occurrence and purification of gums and mucilages; methods for structural analysis, which included hydrolysis, methylation, alcoholysis, glycoside separation, partial hydrolysis, and the theory of the structure; this was followed by a discussion of the analysis of mesquite gum. He carefully outlined the manner in which he had largely ascertained the composition and structure of the gum by determining the components and their linkages. Mr. White pointed out the problems related to this work and the possible pitfalls which might be encountered in the application of this work to the field of the hemicelluloses. Roy L. Whistler, of Purdue University, chairman of the session, capably led a discussion dealing with the results of Mr. White's work.

The sessions on the polyssaccharides were fittingly closed by Dr. Heuser's remarks on his experiences in the field of the hemicelluloses.

Survey in Lignin Chemistry

Dr. Lewis served as chairman of the opening seession on lignin and the extraneous components of wood. The first paper was given by Dr. F. E. Brauns of The Institute of Paper Chemistry. He gave an extensive survey of the field of lignin chemistry and the literature concerning lignin. He emphasized the fact that, as yet, no structural formula has been proposed for lignin which fully satisfies all of its reactions. The principal discussion following this paper centered about the possibility of using a single type of softwood and/or hardwood lignin standardized as to source and method of preparation for fundamental researches into the structure of lignin.

This was followed by a paper given by Alfred Russell, of the Northern Regional Research Laboratory, entitled "Spruce Lignin—Its Structure and Total Synthesis." His synthesis was based on the aluminum chloride-catalyzed rearrangement and polymerization of vanillin acetate in anhydrous nitro-benzene. The physical character and chemical behavior of this synthetic material closely resembled that of isolated spruce lignin. His proposals and contentions brought forth a lively discussion of the question.

A subcommittee was appointed by Dr. Lewis to consider a program for further research into the lignin problem. This committtee questioned the advisability of adopting a standardized procedure for obtaining a lignin product for further research, Dr. Brauns' "native lignin" and Dr. Purves' "periodate lignin" being the two suggestions made, and recommended that graduate students should not attempt lignin investigations except under very adequate and experienced supervision. Experimental work on phenolic aldehyde compounds was suggested as being more suitable. A further suggestion was made that chromatographic adsorption studies might be valuable.

Other Wood Constituents

The absence of Holger Erdtman, of the Institut für Cellulosetechnik und Holzchemie der Königl. Technischen Hochschule, Stockholm, who was scheduled to appear at the meetings, but who was unable to get on the plane from Stockholm, was a great disappointment to all. However, Irvin A. Pearl, of the Institute staff, was called upon at the eleventh hour and very ably prepared and presented a paper on "The Phenolic Constituents of Wood." In addition to giving a survey of the work which has been done on such constituents, Dr. Pearl discussed some specific compounds such as pinosylvin and conidendrin. He spoke of the distribution and occurrence of pinosylvin in various species of wood and its effect on the pulping of woods of these species by the sulphite process. Dr. Pearl gave the history of the isolation, proof of the structure, and compounds related to conidendrin. The structural similarity of conidendrin to NDGA (antioxidant) suggests possible uses of modified conidendrins as antioxidants. In the discussion which followed, Mr. Russell commented that compounds containing a five-membered pyran ring, such as the toad poisons, often are poisonous to animal tissues. Since conidendrin contains a pyran structure, it ought to be studied or tested for such effects. Another problem suggested for study was the distribution of conidendrin in the whole tree, which is at present unknown.

J. C. Pew, of Forest Products Laboratory, spoke on the isolation and identification of a new flavanone found in Douglas fir in a paper entitled "A Flavanone in Douglas Fir Heartwood and Its Influence on Sulphite Pulping." Mr. Pew indicated that the largest yield of this flavanone is obtainable from second-growth trees and he speculated on its influence in the sulphite pulping process.

In "A Review of Wood Coloring Matters," Dr. Ralph L. Shriner, of State University of Iowa, presented a comprehensive discussion of wood coloring matters, giving examples of all known structural types and their origin. Dr. Shriner demonstrated these structural types by the use of numerous slides. He also gave type reactions of many of the materials and in a few cases showed how the structure had been proved.

Dr. G. C. Harris, of the Hercules Powder Company, discussed "Wood Resins." He enumerated the commercial sources of wood resins and the type of compounds obtained therefrom. Dr. Harris spoke in some detail on the chemistry of resin acids, methods of isolation and tests of their purity. Possible causes and remedies of pitch trouble encountered in sulphite pulp were discussed.

The final paper of this section, "Wood Tannins," was given by E. S.

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Flinn, of the Mead Corporation. Mr. Flinn discussed the types of tannins and pointed out which of these materials are used commercially, giving examples of the various types. Projected structures for some of the common tannin materials were presented. Mr. Flinn emphasized that the biggest problem in this field is the development of a domestic source of tanning materials.

No group luncheons or dinners were scheduled. The local section of the American Chemical Society sponsored a buffet supper and general "get together" at the Conway Hotel on Thursday evening.

A meeting of the United Nations, F. A. O. Subcommittee on Wood Chemistry was held at the Conway Hotel on Wednesday evening.

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SYMPOSIUM ON CHIPPING OF PULPWOOD PRESENTED BY PACIFIC SECTION OF TAPPI

About 250 technicians of the pulp and paper industry attended the fall meeting of the Pacific Section of TAPPI at the Longview Women's Club Building, (Longview, Wash.), September 9. Two technical papers and a symposium on the chipping of pulpwood, new development in its testing and use, and the best methods of handling the chips, were presented.

Mark W. Bray, of the Forest Products Laboratory, Madison, Wisconsin, opened the program with a paper on the pulping of dead lodgepole pine. By using slides, he developed a comparison between dead lodgepole pine which has been killed by insects and green cut pine of the same type. He explained that the research was done at the request of the Northern Rocky Mountain Forest Experiment Station to seek a use for the lodgepole pine on thousands of acres of land in western Montana which was killed by an invasion of insects about twenty years ago.

Mr. Bray said the climate of that area provided ideal storage conditions and little decay was found. The material had dried in the arid climate to a moisture content of 18 to 30 per cent. Tests were run on standing dead trees, fallen dead trees, dead wolfing trees, trees which had developed many branches in crowding out other trees, and also normal and rapid growth green material.

Among factors tested were the physical facts of weight, density, volume, percentage of heart wood and chemical composition. Yields under various chemical cooking conditions were tested, and the finished product from each type of wood was tested for bursting, tear and tensile strengths, and folding endurance. Mr. Bray concluded that there was not a large difference in the weight, yield, or strength properties of the pulp of any woods tested.

The next paper was the first entry this year in the Shibley Award competition. The paper, entitled "Insulating Board Handsheets," was presented by Robert V. Pazina of Fir-Tex Insulating Board Company, St. Helens. The Shibley competition is sponsored by the Pacific Section for the purpose of encouraging young men in the industry to present their ideas in papers before the groups.

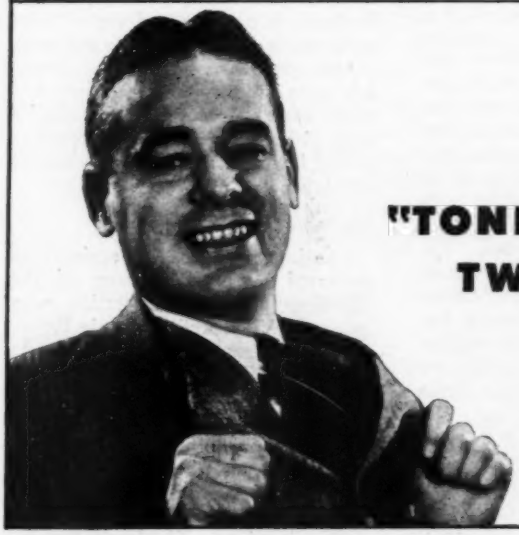
According to Mr. Pazina, the fiberboard industry needs uniform condi-

Members of the panel leading the discussion at the Pacific TAPPI meeting in Longview (Wash.) were: (L to R) Richard N. Hammond, moderator, research department of Weyerhaeuser Pulp Division, Longview; Lester M. Johnson, plant engineer, Soundview Pulp Co., Everett, Wash.; Oliver Morgan, control laboratory Weyerhaeuser Pulp Division, Longview; Richard Wollenberg, chief of engineering division, Longview Fibre Co., Longview; and Walter F. Holzer, technical department, Crown Zellerbach, Camas (Wash.)

Robert V. Pazina of Fir-Tex Insulating Board Co., who presented the first entry in this year's Shibley award at the meeting of Pacific Section of TAPPI, held in Longview, Wash.

Participating in the meeting of Pacific Section of TAPPI, held at Longview (Wash.), were: (L to R) Dr. J. L. McCarthy, University of Washington, section chairman; Mark Bray, of the Forest Products Laboratory, Madison, Wis., who spoke; and Harold Wall, Longview, vice chairman in charge of programs

"MILL EMPLOYEES STRONG FOR TREATED FELTS"



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TAPPI Fall Meeting on Plastics—Pulp and Paper

▶▶▶ THIS MEETING was held at the New York State College of Forestry, Syracuse, New York, September 25 and 26. Registration began 9:00 A.M. on September 25 in Marshall Hall of the College of Forestry. All the meetings were held in Marshall Hall with the exception of the dinner meeting. Exactly 100 people registered for this meeting.

W. F. Gillespie, president of TAPPI, opened the meeting at 9:45 A.M. Mr. Gillespie spoke briefly about the different fall meetings of TAPPI this year. He also emphasized the growing importance of plastics in the pulp and paper industry and pointed out the need for study on the subject which is being undertaken by the Plastics Committee. He then introduced Dr. E. C. Jahn, chairman of the Plastics Committee. Dr. Jahn expressed appreciation of the committee to Mr. Gillespie for his co-operation in the Committee's work and also expressed the pleasure of the committee that he and R. G. Macdonald, TAPPI secretary, could both be present at this meeting. Dr. Jahn then introduced Dr. Joseph S. Illick, dean of the New York State College of Forestry. Dr. Illick spoke a few words of welcome to TAPPI and extended the hospitality of the College to TAPPI. Dean Illick pointed out that the New York State College of Forestry is one of the most diversified forestry institutions in the world and that it actively is working in the fields of pulp and paper and plastics, and that therefore he was especially glad to welcome the Syracuse fall meeting of TAPPI, concerned with the subjects of plastics, to the New York State College of Forestry. Dean Illick also pointed out a few facts concerning the College, covering its foundation, early growth, and present activities. In common with other institutions the postwar enrollment is exceedingly high, whereas prewar enrollment had been established at about 500 students. The enrollment this fall will be about 875. Seventy-five of these men will be pursuing graduate research. The teaching staff has also grown and now numbers 58.

Session on New Resins and Their Application to Paper

The morning session for September 25 was concerned with the subject of "New Resins and Their Application to Paper." Chairman for this session was Dr. R. A. Barkhuff, Jr., a member of the Resins and Plastics Subcommittee.

Lignin Plastic Development

The first speaker was Dr. G. H. Tomlinson II who spoke on "Development of a Lignin for Laminated Plastic." Dr. Tomlinson spoke about the development of lignin plastic as worked out by the Howard Smith Paper Mills Ltd. Since lignin from deciduous woods has a lower melting point than coniferous lignin, it was decided to use lignin from black soda liquor obtained by the cooking of poplar wood. A finely divided lignin acid salt is precipitated from the liquor by the carbon dioxide in flue gases. After separating this lignin precipitate, it is further purified by redissolving and precipitating by acid to give particles of a desired particle size. After drying, the lignin powder is ready for use. In the making of laminated products. it is blended with 60 per cent of fiber in the beater. In this way, the laminating paper is formed directly on the paper machine. This finished laminating sheet is then ready for manufacture into laminated boards, etc. The sheets are pressed at about 800 pounds psi in a ten-opening press. Various overlay sheets such as melamine impregnated paper, etc. may be applied. Attractive decorative and structural panels are manufactured using lignin filled paper.

Lignin in Laminated Materials

Robert J. Seidl then discussed lignin filled laminated paper plastics. Mr. Seidl discussed the general subject of the use of lignin in laminated materials both for core material and as overlay materials. He pointed out that there was no advantage in the use of lignin as a surface or coating material since it was not film forming. However, as a binder for laminated boards, lignin had many advantages.

Polyester Resins

D. G. Patterson next presented a paper on "Use of Polyester Resins with Pulp and Paper." The polyester resins have been found suitable for a number of applications with pulp and paper. For example, they can be used in pulp molding wherein the fiber mold is impregnated with the liquid resins and then molded in the usual way. The polyester resins are also suitable for surfacing, such as on Masonite, etc. They give excellent abrasion resistance and resistance to chemicals. The resin is sprayed on the surface in a solvent and, after the solvent is evaporated, the article is pressed. Laminated articles can also be made, using polyester resins. Curved shapes can be made using crepe paper. Excellent results are obtained with glass cloth. These resins are particularly suitable for decorative laminants.

Synthetic Latices as a Pigment Binder

E. K. Stilbert then presented a paper on "New Synthetic Latices As a Pigment Binder in Clay Coated Papers." This resin, known as Dow Latex 512, is a styrene-butadiene polymer. It readily forms a water emulsion containing 45 per cent solids. The material formed soft films which are tacky but, if covered with talc, are nontacky and pliable. The materials are finding application for binding cotton felted fibers and for sizing cotton thread. It is also used with clay in oilcloth and linoleum. With clay it forms a very good coating for decorative and wall papers. It is also suitable in leatherette type covers and as an invisible water washable coating. It may also be used with starch in machine coating, giving high gloss and high resistance to ink penetration.

Synthetic Resin Fibers

The last paper in this session was presented by H. E. Shearer of the American Viscose Corporation who spoke on "Vinyl Resin Fibers in Papermaking." Mr. Shearer discussed the problem of blending synthetic resin fibers such as Vinyon, Saran, etc. with normal papermaking fibers. At present, only Vinyon is available in fine staple form. Mr. Shearer described the properties of Vinyon fibers, but pointed out the difficulties in blending them with pulp fibers. The low water absorption and thermoplastic properties of Vinyon make dispersion and beating difficult. It is necessary, of course, to reduce the Vinyon fibers to papermaking lengths. This is best done in a beater. It is necessary to use a suitable wetting agent such as Triton K-60 and an antifoaming agent during beating. By proper feeding of the beater to about 2½ per cent consistency and by blending in about 20 per cent of sulphite pulp, good results are obtained without excessive cutting. Fifteen to 20 per cent of Vinyon in a paper produces a good product for many uses.

Session on Resin Analysis

The Thursday afternoon session was devoted to resin analysis. Dr. T. A. Howells, chairman of the Subcommittee on Resin Analysis, was chairman for this discussion. Dr. Howells first introduced the general problem of resin analysis and then called upon C. S. Maxwell to report on the activities of A.S.T.M. and of A.A.T.C.C. in con-

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Fig. 375—200-pound Bronze Gate Valve. Screwed ends, inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel-bronze disc.

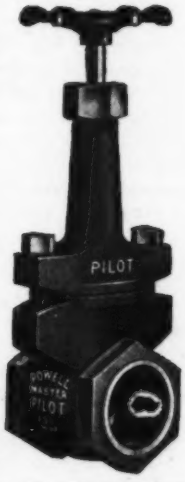

Fig. 1460—Iron Body Bronze Mounted "Master Pilot" Gate Valve. Screwed ends, rising stem, bolted flanged bonnet and taper wedge solid disc. Also available in All Iron.

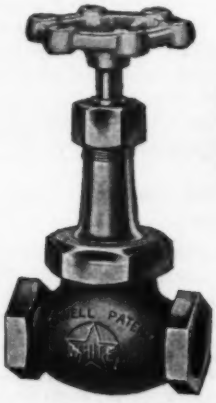

Fig. 1708—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable, wear-resisting "Powellium" nickel-bronze disc.

Fig. 560—200-pound Bronze Regrinding Horizontal Swing Check Valve. Screwed ends, screwed-on cap and regrindable, renewable bronze disc.

Fig. 1793—Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", inclusive. Has outside screw rising stem, bolted flanged yoke and taper wedge solid disc. Taper wedge double disc can be provided in sizes 2" to 12", inclusive.

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POWELL VALVES

nection with the problems of resin analysis. Following this report came a discussion of the quantitative determination of resins and volatile contents in resins and impregnated papers. L. V. Larsen, of the General Electric Company, described the present practice in the laminating industry. Dr. A. L. M. Bixler pointed out the problems in the paper mill in connection with these analyses, and Harry Kline presented the viewpoint of the resin manufacturer. It was pointed out that the test for volatiles, as used by different companies, varied but little from the A.S.T.M. method. Mr. Kline pointed out that the volatile test is an arbitrary measure of flow and that the volatiles must be suited to a particular resin. The flow test is considered to be a better indication of actual flow conditions. There appears to be no uniformity in testing for solids, and the solids test usually gives a lower figure than the actual solids placed in the resin by the manufacturer.

Dr. Howells then introduced the subject of qualitative test for wet strength in papers. The small amounts of urea and melamine resins in wet strength papers are very difficult to detect. N. Yorke discussed the need for wet strength tests by the laminating mills. C. S. Maxwell concluded the discussion by pointing out some possible approaches to the problem. Generally speaking, wet strength papers must be broken down by a hydrapulper or beater using high pressure steam.

The final paper on the resin analysis session was presented by J. C. Parsell, of the J. P. Lewis Company. This paper was on "Physical and Chemical Testing of Paper-Plastics Combinations and of Molded Products." Mr. Parsell presented a very good review of the different tests necessary for different paper-plastic combinations including saturated papers, laminating papers, coated papers, etc.

Dinner Meeting

At 7:00 P.M. a dinner meeting was held in the east ballroom at the Hotel Syracuse. After the dinner the chairman, Dr. E. C. Jahn, called upon Professor C. E. Libby to say a few words. Professor Libby, who is head of the Department of Pulp and Paper Manufacture at the New York State College of Foresty, stated his pleasure that the meeting was being held at the College of Forestry and was glad that his department could co-operate with TAPPI in this regard. Next the chairman called upon G. S. C. Semmens, of the Australian Paper Manufacturers Ltd., Melbourne, Australia. Mr. Semmens, in a few minutes, presented a very clear, interesting and humorous picture of paper manufacturing in Australia and general remarks about his country. He pointed out that the principal wood used is the eucalyptus, a very short fibered hardwood. Even groundwood pulp is being manufactured from the eucalyptus.

The chairman then called upon Dr. Werner Kaufman, chairman of the Coating Committee. Dr. Kaufmann spoke briefly about the work of the Coating Committee in the preparation of their monograph on "Resins for the Paper Converter." This monograph was prepared for the Coating Committee by S. S. Gutkin and G. C. Borden. Dr. Kaufmann then introduced S. S. Gutkin, who presented a summary of the monograph under the title of "Plastic for Paper Coating." Following Mr. Gutkin's thorough review of the subject, K. W. Britt, chairman of the Wet Strength Committee, presented a review of developments in wet strength paper. One of the interesting facts brought out by Mr. Britt is that it is not necessary for wet strength papers to be immersed in water for the property of wet strength to be of importance. Even in the range of 12 to 15 per cent moisture, which may be obtained merely by exposure to damp atmosphere, the differential in tensile strength between the wet strength and untreated paper is as great as that in the saturated condition. Mr. Britt pointed out that the spectacular rise in the use of synthetic resins for wet strength paper has had a tendency to put other materials and methods into the shade.

Session on Fabrication and Conversion

The meeting reconvened at 9:30 A.M. Friday morning with R. H. Mosher, chairman of the Subcommittee on Fabrication and Conversion, as chairman. Mr. Mosher first called upon R. J. Seidl to present his paper on resin treated papers for plywood overlays and for honeycomb core materials.

Veneer Overlays and Honeycomb Cores

Mr. Seidl discussed in considerable detail the development work at the Forest Products Laboratory for both veneer overlays and honeycomb cores. Veneer overlays give not only attractive decorative results but also greatly increase the strength of veneers. It is possible to build a composite structure of veneer and paper overlays which is equally stiff in all directions. Papers treated with water resistant resins may be corrugated and then combined in different ways to form a strong honeycomb structure which may be placed between wood veneers, plywood, aluminum sheets, etc., to form panel sandwiches of high strength, exceedingly light weight, and excellent insulating value. An experimental house has been built of different types of honeycomb wall panels as well as floor panels. The latter contains built-in copper tubing for heating.

Laminates from Absorbent Kraft Paper

Next C. J. Straka, of the Westinghouse Electric Corporation, presented a paper on "Causes of Dimensional Instability Due to Immersion in Water." Mr. Straka discussed the effect of dimensional stability from the point of view of relation of water absorption to strength and related the problem to resin content, curing time, type of paper used, etc. Most of the data presented dealt with laminates made from absorbent kraft paper. It was found that the degree of impregnation with a given paper varies with the molecular complexity of the resin used. Resins of small molecular size give good results. Furthermore, in such cases water solvents can be used which have a strong swelling action on the fiber and thus aid the impregnation. The type of paper used and its properties greatly affect the properties of the final laminate. The mechanical treatment of the fibers has a very great influence on absorbency. The presence of impurities in the sheet results in a product of inferior strength. The operations on the paper machine, such as the degree of compression of the wet sheet and the nature of the drying, influence the properties of the final product.

Pulp Molding Problems

R. H. Mosher then discussed briefly problems in connection with pulp molding. He also introduced the subject of punching stock. Messrs. Yorke, Kline and Larsen all contributed at some length to the discussion of manufacturing a punching stock and pointed out the properties required and the A.S.T.M. test which most manufacturers use as standard. Next, Mr. Mosher discussed the problem of wildness, using the notes of E. G. Ham, of the John E. Manning Paper Company. Means for measuring wildness were discussed, and the relative merits of different methods of testing were pointed out.

Mr. Mosher ended the morning session with a brief discussion of the work of the Subcommittee on Fabrication and Conversion, pointing out that up to date the work of the committee had been concentrated on struc-

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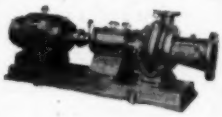
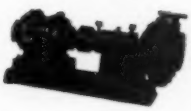
What's the best stock pump for sulphate, sulphite, soda, ground wood, waste paper, cotton linters, etc.?		An FP pump will handle them at capacities up to 6,000 gpm, heads to 200 ft. and consistencies to 7%.
How about a good white water or fan pump?		Use L and LA pumps for all heads and capacities with consistencies up to 1%.
What's a reliable pump for green or white liquor?		A CG Worthite is the ideal pump for dissolving-tanks, transfer and causticizing.
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tural materials such as laminates and pulp molding. In the future it is proposed that a new subcommittee be formed to take up the problems of the plastics coaters, paper saturators, etc.

General Session

The final session took place Friday afternoon, beginning at 2:00 P.M. This session started with brief talk by Carl Bergendahl, of the New York State College of Forestry, on the subject of "Silicones for Paper Sizing." Mr. Bergendahl pointed out that less than 1/10 per cent of a silicone in distilled water gives good sizing. When tap or lake water is used, the sizing quality falls off considerably for reasons as yet unknown. The silicones are best applied in the beater at a *p*H of about 4.3.

Next followed a discussion under the chairmanship of Dr. R. A. Barkhuff, Jr., on the best way in which the Subcommittee on Resins and Plastics can help the Committee as a whole and the pulp and paper industry. This subcommittee is composed of the resin producers, and it was felt that its greatest contribution would be in serving as a clearing house for information concerning resins and their application to pulp and paper.

Next followed a discussion of important aspects of resin analysis under the chairmanship of Dr. T. A. Howells. It was agreed that it would be of value to the industry for the Resin Analysis Subcommittee to gather together the various test methods for resin solids, volatiles, wet strength resins, etc., and present these in the form of a mimeographed paper for future discussion and ultimate recommendations. R. A. Mosher then led a discussion of the principal problems in connection with fabrication and conversion. Following this discussion a short business meeting of the Plastics Committee was held.

No formal luncheons were held, but those attending the meeting met together informally for lunch on both Thursday and Friday at Drumlins, which is a country hostelry just outside Syracuse.

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TAPPI COMMITTEE SELECTS W. R. BARBER AS VICE PRES.

The Executive Committee of the Technical Association of the Pulp and Paper Industry has selected William R. Barber, technical director of the Crown Zellerbach Corporation, Camas, Washington, to fill the office of vice president of the Association, which became vacant when W. F. Gillespie became president to succeed the late Worthen E. Brawn, who was made president at the annual meeting in February, 1947.

This action by the Executive Committee was authorized by Art. V., Sec., 5 of the Association's constitution.

Mr. Barber has been a leader in Technical Association activities for several years, particularly in advancing the interests of the TAPPI Pacific Section. He will serve as vice president for the balance of the administration year, ending in February, 1948.

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CHICAGO PAPER GROUP OPENS SEASON WITH PANEL DISCUSSION ON PACKAGING

The Chicago Professional Paper Group, a section of TAPPI, opened its 1947-48 season with a dinner meeting at the Chicago Bar Association, September 15. The program consisted of a panel discussion on "Paper and paperboard as bulk packaging materials for corrugated carton, multiwall bags, fiber drums—their advantages and limitations."

E. R. Bolman, sales manager of the paper and laminated products division of the Chase Bag Company, Chicago, opened the panel with a description of the application of various types of paper to the manufacture of mutiwall, waterproof paper lined, open mesh and lined Duratex bags; barrel and case liners and Duplex papers. Testing methods and performance standards of shipping containers were discussed by Charles J. Zusi, vice president of the Container Laboratories, Chicago.

A. J. Godshalk, sales manager for Fiber Drum Company (Kankakee, Ill.), spoke on the fields of usage for solid fiber drums and pails. He also explained the use of linings and interior bags and liners for protection of various types of contests. The final portion of the panel was a description by Paul Meelfield, advertising and sales promotional manager for the Hinde and Dauch Paper Company, Sandusky, Ohio, of new developments in the design of corrugated shipping boxes for rail, truck, and air freight. His talk included display boxes, dual-use packages, and new types of wrapping and packaging materials.

Samples of all the subjects under discussion were shown by the speakers, and the panel was followed by an open discussion. A. L. Green, special representative for the Freight Claim Division of the Association of American Railroads, presided as moderator.

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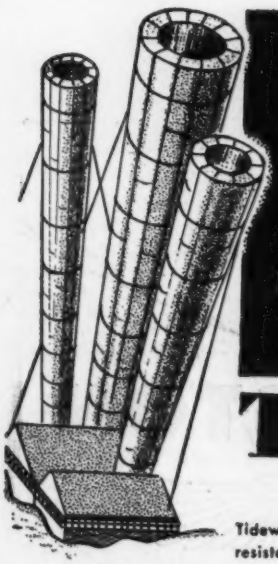
▶▶▶ THE TWELFTH ANNUAL essay contest sponsored by International Printing Ink in cooperation with the National Graphic Arts Education Association has been announced.



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A new pulping machine developed by E. D. Jones & Sons Company, Pittsfield, Massachusetts, was named in a contest which closed July 15, 1947. The contest was open to executives, operators or employees of paper mills.

The contest committee studied carefully all entries and selected the name "Jones Pulp-Master," which was submitted by Joe E. Stevens, tour foreman in the sulphite department of The Northwest Paper Company, Cloquet, Minnesota. Mr. Stevens was given a five-hundred-dollar cash award for suggesting the name.

Joe E. Stevens

Joe Stevens is 36 years of age. He attended high school and Northwestern Preparatory Academy prior to his connection with the Northwest Paper Company in 1929. After various jobs he became sulphite cook, and in 1941 has was promoted to tour foreman.

The "Jones Pulp-Master" takes a one-ton charge in full bales of pulp or wastepapers and thoroughly disintegrates the material for subsequent refining processes at consistencies ranging from 3 per cent to 8 per cent in ten minutes for pulp, or 30 to 40 minutes for wastepapers. Wet strength papers take slightly longer periods.

The contest committee expresses its thanks to all of the mill men who submitted entries.

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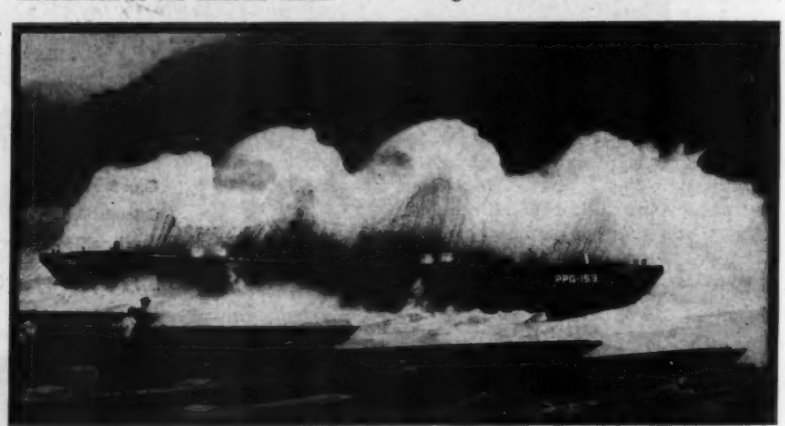
BARGE SHIPPING SERVICE INAUGURATED BY SOUTHERN ALKALI & COLUMBIA CHEM.

More economical delivery of liquid chlorine to many large-quantity users will result from the installation of a fleet of eight new tank barges by Columbia Chemical Division of the Pittsburgh Plate Glass Company and its affiliate, Southern Alkali Corporation. Plants to be served are those along the inland waterways system embracing the Mississippi and Ohio Rivers and their tributaries, the intracoastal canal in Texas and Louisiana, and along the Gulf Coast as far as Florida.

The eight all-steel barges were designed by the Dravo Corporation, Pittsburgh, in collaboration with engineers of the chemical companies. Four barges have been launched and the others are awaiting delivery and installation of the chlorine tanks.



One of eight new chlorine tank barges—first ever specifically designed and built for such service—is launched into the Ohio River at Dravo Corporation's Neville Island shipyard where they were constructed. Columbia Chemicals Div. of the Pittsburgh Plate Glass Co., and an affiliate Southern Alkali Corporation, will use the fleet of barges to effect more economical delivery of bulk chlorine to larger users along the inland waterways

▸▸▸ POSTWAR PROGRESS in the chemically controlled industries will be a significant feature at the 21st Exposition of Chemical Industries at Grand Central Palace, New York, December 1-6. The exposition will be one of the largest of its kind now held with an unusual variety of displays including industrial chemicals, chemical products, industrial materials and supplies of many kinds, in addition to the wide range of equipment specifically designed for the process industries. The International Exposition Company is staging the Exposition.

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OTS ANNOUNCES SALE OF TWO REPORTS ON GERMAN PAPERMAKING INDUSTRY

German processes for making paper out of rye straw and esparto grass are described in one of two British reports on the German papermaking industry now on sale by the Office of Technical Services, Department of Commerce. Rye straw and esparto grass paper was made at the J. W. Zanders paper mill at Bergisch Gladbach, near Cologne, one of 21 large papermaking and paper machinery manufacturing plants visited by a team from the British Intelligence Objectives Sub-Committee.

The report covers a cross section of the German papermaking industry and gives data on manufacturing processes used in making every type of paper. The investigators saw no significant new developments in papermaking, but several plants used novel methods and a number of improvements were planned by paper mill machinery manufacturers.

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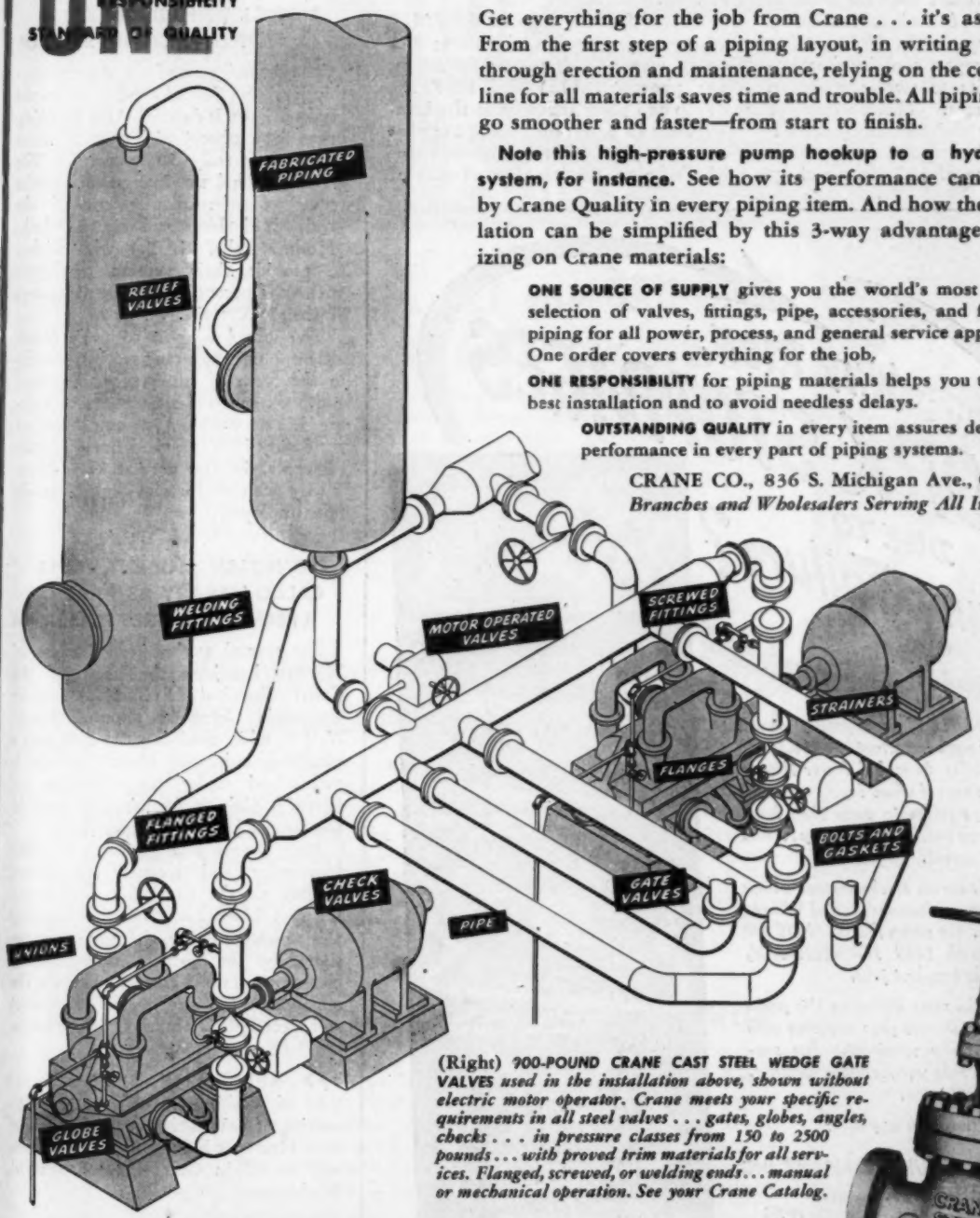

Piping hookup to pumps and accumulators in a high-pressure hydraulic barker system.

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CRANE

FOR EVERY PIPING SYSTEM

the team found novel tumbling cookers or boilers utilized for boiling the rye straw. Caustic soda only was used for cooking at about 14 to 16 per cent strength. Both paper mills maintained a pressure of about 90 lb. psi in the boilers. The report contains sketches and diagrams of various machinery used in the paper mills.

The second report contains short accounts of visits to twelve plants in the Leipzig area. Manufacture of straw pulp by the sulphate process is described. The report also contains a short mention of a German packaging institute and describes experiments made there in measuring the rate of transmission of odoriferous substances through papers with a view to determining their efficiency as protective materials for wrapping butter, cheese, etc.

Orders for the reports, PB-75876 (German papermaking industry; 173 pages, diagrams, drawings; microfilm, $4; photostat, $12) and PB-75834 (Pulp and paper industry in the Leipzig area; 18 pages; microfilm, $1; photostat, $2) should be sent to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the treasurer of the United States.

◆

SANDY HILL EMPLOYEES ENROLL IN HUDSON FALLS APPRENTICESHIP SCHOOL

The second year of the Apprenticeship Training School conducted in the Hudson Falls Industrial Arts Building began September 6 with an enrollment of approximately 50 veterans. The training school was inaugurated at the request of the management of the Sandy Hill Iron and Brass Works (Hudson Falls, N. Y.) who wished to provide their veteran employees with an opportunity to take advantage of their G.I. training rights.

The school is open to nonveterans although only veterans receive benefits in the form of subsistence allowance and book and tool allowances. Training is not confined to employees of the Sandy Hill Iron and Brass Works. However, in the present class there is only one enrollee who is not a Sandy Hill employee.

◆

NORWEGIAN STUDENT VISITS CALCO LIBRARY AS PART OF SPECIAL LIBRARIES PROGRAM

For several weeks Anne Lovaas of Norway has been the guest of the Calco Chemical Division, American Cyanamid Company (Bound Brook, N. J.), while studying the company's extensive industrial library which is maintained under the direction of Betty J. Cole, a former president of the Special Libraries Association.

Miss Lovaas is a graduate of Oslo University and recently completed courses at the Columbia University Library, New York. She is visiting this country under the program designed by the Special Libraries Association to grant a foreign student the opportunity to study special libraries and special library methods in America.

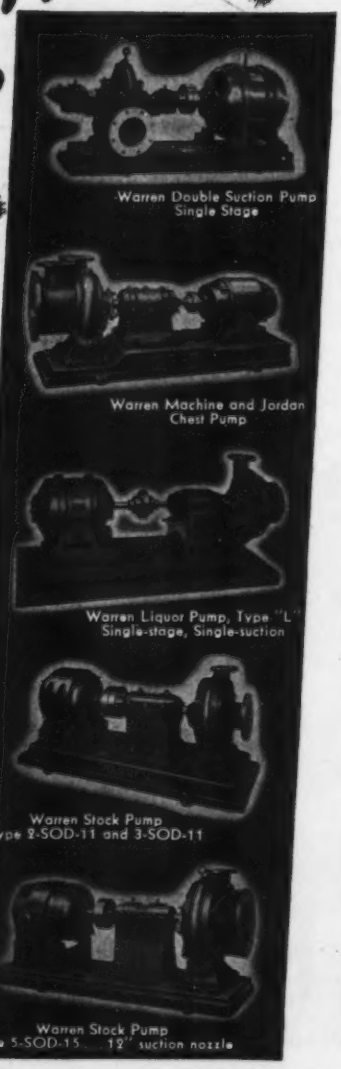
◆

▶▶▶ REPRESENTATIVE IN the state of Washington for the sales engineering of heat exchange equipment of Ross Heater & Mfg. Co., Inc., Buffalo, will be Chain Gear, Inc. of Seattle, Washington.

◆

▶▶▶ NEW SALES OFFICES have been established at Seattle, Washington and Portland, Oregon by Electric Machinery Mfg. Company, Minneapolis. The Seattle territory will be handled by A. C. Petrich, and George R. Schultz will cover the Portland territory. Both men are from the Garland-Affolter Engineering Corporation.

WHY RISK WORK STOPPAGES DUE TO Pump Failure?



CONTINUITY of paper production was never more important than NOW. Nothing slides down hill faster than a production record when faulty or inefficient pumps refuse to carry their load. Profits disappear... orders pile up... and labor costs mount.

Replace time-worn or obsolescent pumps with modern, performance tested Warren Pumps . . . the pump that STANDS UP LONGER with LESS MAINTENANCE, even on your toughest jobs.

Why not take some action on this problem today? Discuss your situation with a Warren Pump specialist. His suggestions will help you maintain constant, profitable production.

Write, wire or phone:

WARREN STEAM PUMP COMPANY, INC.
Warren, Massachusetts

PP7½

WARREN PUMPS

One Glance Tells You that

Only the SIDE of a V-Belt TOUCHES the Pulley

Diagram of V-Belt in Sheave Groove

The *SIDE* Does ALL the GRIPPING That's Why it *GETS the WEAR!*

One glance at a V-Belt in its sheave shows you that only the sides of the belt *touch the pulley*. Every ounce of load the V-Belt carries must first be picked up by the sides. The sides do all the *gripping*—they get all the *wear* against the sheave groove wall. They pick up the load. They transmit that load to the belt as a whole. Then, once again, the sides—and the sides *alone*—grip the driven pulley and deliver the power to it.

Naturally, this explains why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that *wears out first.*

★*Now See How the Patented* CONCAVE SIDE *SAVES Sidewall Wear—Lengthens Belt Life!*

Because the life of a V-Belt depends, first of all, on the sidewall, it is clear that anything which prolongs the life of the sidewall will lengthen the life of the belt. The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

★*Longer Sidewall Wear* Is MORE IMPORTANT NOW Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even *more work* in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

4710

The CONCAVE SIDE is a GATES PATENT

Straight Sided V-Belt

Fig. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Fig. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

Fig. 2-A

So bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much

THE GATES RUBBER COMPANY DENVER, U. S. A., *"World's Largest Makers of V-Belts"*

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

Gates — THE MARK OF SPECIALIZED RESEARCH

NAMES in the News

Douglas Nelson Smith Clark Spaulding WHITE CLEVELAND Arthur Wolf Morris Simpson Kraft Bryan Temple

PERSONALS

GEO. S. DIVELY ELECTED PRESIDENT AND GENERAL MGR. OF HARRIS-SEYBOLD COMPANY

New president and general manager of the Harris-Seybold Company, Cleveland, is George S. Dively. He was chosen by the board of directors at a recent meeting to succeed the late Alfred Stull Harris.

Associated with Harris-Seybold for more than ten years, Mr. Dively served as secretary-treasurer prior to 1944. He has been a member of the board of directors since 1941.

George S. Dively

Before joining Harris-Seybold, Mr. Dively had an unusually broad experience in engineering, production, sales and finance. His experience included positions with the Wagner Electric Corporation, North American Refractories Company, Carrier Corporation, and Republic Steel Corporation.

Mr. Dively is a graduate of the Engineering School of the University of Pittsburgh and of the Harvard Graduate School of Business Administration. Among numerous association activities he was recently elected a vice president of the American Management Association.

◆

▶▶▶ The Black-Clawson Company has announced that *C. H. Butterfield* is now a member of the sales staff at the Hamilton Division. As the fourth generation of a family of paper mill operators, Mr. Butterfield comes to The Black-Clawson Company with 28 years of paper mill experience in mill operation and engineering.

◆

▶▶▶ Three changes have been made in the sales management personnel of Link-Belt Company. *James B. Elliott*, divisional manager for Caldwell plant products, has been appointed divisional sales manager at the Minneapolis plant. *Erwin A. Wendell*, former district sales manager of the Chicago branch, has been named divisional sales manager for Caldwell plant products. District sales engineer at New York, *T. W. Matchett*, has been appointed district sales manager of the Chicago branch.

◆

▶▶▶ The Poole Foundry & Machine Company (Baltimore, Md.) has appointed *C. M. Murray* as their exclusive Canadian representative in the provinces of Ontario and Quebec for the sale of Poole flexible shaft couplings.

◆

BAUER AND LENZ APPOINTED ASSISTANT MANAGERS AT MONSANTO CHEMICAL CO.

New assistant managers of the process section of Monsanto Chemical Company's general engineering department are R. L. Bauer and R. E. Lenz. Mr. Bauer will be the senior assistant and will assume responsibility in the absence of the section manager. Work of the section will be generally divided along technical and administrative lines, with Mr. Bauer primarily responsible for the technical phase and Mr. Lenz for the administrative phase.

Mr. Bauer was employed by Monsanto in 1937 at the company's Monsanto, Illinois plant and was afterwards in charge of production for the W. G. Shelton Company and the National Compounding and Chemical Company. He became a member of the general development department at Monsanto in 1945 and was transferred to the process section of the general engineering department in 1947. Mr. Lenz was employed by Monsanto in 1940 as a research chemical engineer in Alabama and Ohio. He was later transferred to the general development department at St. Louis in 1945, and to the process section of the general engineering department in 1947.

◆

STANLEY REED PROMOTED TO VICE PRESIDENCY OF CRYSTAL TISSUE COMPANY

The directors of The Crystal Tissue Company (Middletown, Ohio) have elected Stanley H. Reed as vice president in charge of sales. A member of the Crystal company for 17 years, he has been sales manager the past few years.

Stanley H. Reed

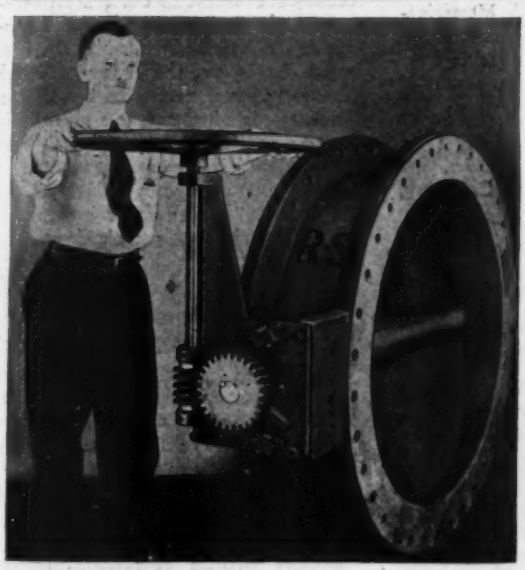
Mr. Reed is a graduate of Ohio Wesleyan University. He is active in the Tissue Association as vice chairman of the wrapping tissue group and the gift wrapping group.

◆

▶▶▶ "America's New Responsibilities" was the subject of an address made by *J. D. Zellerbach* at a luncheon of the World Affairs Council of Northern California in St. Paul recently. Mr. Zellerbach, president of Crown Zellerbach Corporation, was United States employer delegate at the thirtieth International Labor Conference last June in Geneva.

R-S ValvEvents

ISSUED PERIODICALLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH FLOW CONTROL AND SHUT-OFF



One of the Large Size R-S Rubber-seated Valves

Picture shows an R-S 42-inch Standard Iron Valve equipped with R-S rubber spool (patent pending) for positive shut-off.

The replaceable rubber spool is available for all R-S Valves up to 72-inch. We are working on sizes up to 108-inch diameter.

Many and rigorous tests have proved the remarkable wearing quality of the rubber spool. One user, handling powdered glue, arranged a test which would automatically open the valve wide, then slam it tight with a 50-pound counterweight. At the end of 9000 consecutive closings from the wide open position the valve was still drop-tight at 115 p.s.i.

Perfect closure is attained even at the shaft-bosses, by the wedge-like action of the disc as it closes within the spool and bunches up the rubber around its periphery.

Replacement of the rubber spool is simple, though it has never yet been necessary in service. Valve body is freed from the pipe, disc removed, and the spool folded and slipped out of the valve. A new spool is folded and slipped in similarly. The flanges are smoothed down and the valve reassembled. No regular gaskets are required when the rubber spool is used and this fact alone represents a substantial economy.

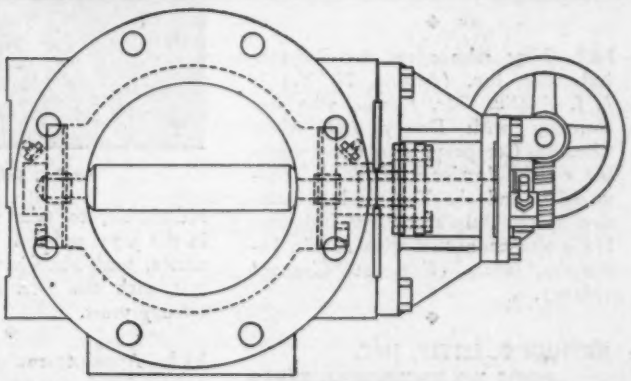
The R-S Rubber-seated valve affords remarkably good resistance to abrasion.

Lest You Forget!

You can't buy R-S Valves in the corner drug-store but there is a surprising number of places where you *can* buy them or reach a representative who will call on you with drawings, pictures, data, characteristic curves, prices and whatever else you need to know. We can also supply you direct from the factory with very complete information if you will inform us of your requirements. Tell us size of valve, type of flanges, material to be controlled, line pressure, pressure drop, operating temperature, rate of flow, and method of control desired.

The list of representatives' locations is complete as this issue of R-S ValvEvents goes to press, but it is a steadily growing list. In all these cities you will find the representative's address and phone number in the local phone book under the heading "R-S Products Corporation, Valves."

The list of representatives' locations follows:



Atlanta
Appleton, Wis.
Baltimore
Birmingham, Ala.
Bloomington, Ill.
Boston
Buffalo
Caracas, (Venezuela)
Charlotte, N. C.
Chattanooga
Chicago
Cincinnati
Cleveland
Corpus Christi
Denver
Des Moines
Detroit
Houston
Indianapolis
Johnson City, Tenn.
Knoxville
Los Angeles
Milwaukee
Minneapolis
Monterrey, (Mexico)
New York
Panama, (Panama)
Philadelphia
Pittsburgh
Portland, Ore.
Richmond, Va.
St. Louis
San Francisco
Santiago, (Chile)
Seattle
Syracuse
Tulsa
Youngstown

New 50-pound Valve

Drawing shows details of the new R-S 50-pound Class B Iron Valve. This was designed especially for rugged hydraulic service with the usual R-S safety factor to care for line stresses, water-hammer, and other service abuse. The new valve is in demand for circulating water lines for condenser service. It is available with 25-pound or 125-pound American Standard flanges. Like all R-S Valves, it may be ordered in any material that can be cast or welded, including steel with Series 15 150-pound American Standard flanges. The new valve has the characteristic R-S angular seating disc and may be equipped with the patented R-S Rubber Spool for positive shut-off. (See pic upper left).

Complete R-S Valve Installation Data

Engineers like the complete dimensional data supplied for R-S Valves. Dimensions are tabulated by standard sizes under stock types and identified by letters corresponding to detailed drawings which accompany the tables. Six full pages of R-S Products' Catalog No. 14-B (copy on request to R-S Products Corporation, Wayne Junction, Philadelphia 44, Pa.) are devoted to this basic installation data.

BROWN INSTRUMENT CO. ANNOUNCES CHANGES IN BRANCH OFFICE STAFFS

New sales and service engineering staff changes have been announced by the Brown Instrument division of the Minneapolis-Honeywell Regulator Company.

Edward B. Kohl, previously with the Houston branch office, has been transferred to Corpus Christi.

I. K. Farley has been transferred from the Philadelphia branch office to Houston.

John D. Root, formerly instructor at the Brown School of Instrumentation, has been made sales engineer at Philadelphia.

E. Curt Richards has been transferred from the company's general sales department to the New York sales engineering staff.

Thomas Pitts has been appointed industrial sales engineer at the Charlotte branch office.

◆

▶▶▶ *Ernest R. Hanson,* well known in the field of plastics through his long connections with the Halowax Corporation and the Bakelite Corporation, has joined the staff of Foster D. Snell, Inc., New York, to head up research and development in the field of plastics and rubber.

◆

▶▶▶ New sales agent for Polymer Industries, Inc. (Astoria, N. Y.) is *J. J. Austin.* Mr. Austin, who was formerly with Dewey and Almy Chemical Company, is an active member of the Institute of Food Technologists and the Technical Association of the Pulp and Paper Industry. He is also connected with Austin Industries, with offices at Concord (Mass.).

◆

ARTHUR D. LITTLE, INC. ADDS TO TECHNICAL STAFF

Several additions to its technical staff were announced recently by Arthur D. Little, Inc., Cambridge, Massachusetts. These additions are part of a substantial expansion in staff during the current year, because of increased demand for research services by both industry and government.

The staff additions include Russell J. Bowen, who recently completed study for a master's degree in chemical engineering; Robert W. Fabian, formerly engaged in governmental research at Wesleyan University; Thomas Hall, recently granted a master's degree in organic chemistry; William V. Keary, chemical engineer formerly with Publicker Industries, Inc. (Eddington, Pa.); Benjamin A. Lambert, chemical engineer previously with Polaroid Corporation (Cambridge, Mass.); Albert E. Mignone, mechanical engineer and formerly research director for the U. S. Naval Torpedo Station (Newport, R. I.); George E. Richter, electronics engineer previously with Ruge-deForest, Cambridge, Massachusetts; Richard W. Tindal, economic analyst, formerly operating his own manufacturing business in Springfield, Massachusetts; and Elizabeth Thorogood, biologist formerly engaged in teaching.

◆

▶▶▶ Former sales manager of the Sterling Pulp & Paper Company (Eau Claire, Wis.), *Paul F. Solheim,* has joined the Badger Bearing Company,

Paul F. Solheim

Milwaukee, to take up its activities in the paper mills of Wisconsin, Minnesota, and Michigan. Mr. Solheim was with the Sterling company for twenty years.

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▶▶▶ Appointment of *Eugene Davis* as real estate manager for the Pacific Paperboard Company at Longview, Washington, has been announced by the company president, E. E. Flood.

◆

KUEHN APPOINTED HEAD OF CHAMPLAIN'S CHICAGO DIV.

A machine designer of the Champlain Corporation of Bloomfield, N. J., for four years before the war, Albert T. Kuehn, has been appointed head of the company's Chicago district. Mr. Kuehn's background in the graphic arts field includes 18 years experience in the design, engineering and manufacture of printing presses and allied equipment of every type.

One of Mr. Kuehn's important achievements with Champlain was his work with Adolph Weiss in the redesigning and modernization of the Weiss gravure fully enclosed ink fountain and the incorporation of this feature into the Champlain process. Design of equipment used for producing fiber milk containers was another project under his direction.

◆

▶▶▶ The newly-created position of technical assistant to the general manager of the Kodak Park plant in Rochester (N. Y.) will be filled by *Dr. Emmett K. Carver,* the Eastman Kodak Company has announced. Dr. Carver joined Kodak in 1924 as a chemist in the research laboratory. *Dr. Charles R. Fordyce* has been named to succeed Dr. Carver as superintendent of the department of manufacturing experiments which was organized by Dr. Carver in 1928.

◆

SIX STAFF PROMOTIONS ANNOUNCED BY MONSANTO

Promotion of six staff members of Monsanto Chemical Company's Central Research Department at Dayton, Ohio, was announced recently by the company.

Dr. Wendell P. Metzner, a research group leader at the Central Research Department, has been promoted to associate director of research in the rubber service department of Monsanto's Organic Chemicals Division at Nitro, West Virginia.

Dr. Reid G. Fordyce has been promoted to manager of sales development of the company's Plastics Division at Springfield (Mass.). Dr. Fordyce is also a group leader at the Central Research Department.

Dr. Rudolph L. Heider and Alfred B. Craig have been appointed group leaders of the process research and plastics evaluation groups, respectively.

Dr. Earl C. Chapin has been appointed acting group leader of a polymer research group at Dayton, replacing Dr. Fordyce.

Dr. George L. Wesp has been assigned as acting group leader of another polymer research group, replacing Dr. Metzner.

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▶▶▶ At a meeting of the board of directors of the Lockport Felt Company, Newfane, New York, *Roy T. Yates* was elected a director.

◆

▶▶▶ Associated with the Detroit Sulphite Pulp & Paper Company for the past seven years, *Martin F. Schnaufer,* has been appointed chief engineer, succeeding *Ernest Gschwender* who recently retired. Mr. Schnaufer was formerly plant engineer.

"Good to the last drop"

OF COURSE we like to hear mill superintendents say that Hamilton Felts are "good to the last drop." That's the way we make them . . . to last longer and to produce paper and board at *lowest felt cost* per ton.

BUT WHAT REALLY COUNTS is the fact that Hamilton Felts produce at *lowest total cost* per ton . . . lowest cost for the felts themselves . . . lowest cost for heating the driers . . . lowest cost for productive and unproductive time.

HOWEVER, it is false economy to run any felt until it is worn out. After it has been in service for 75% of its "life," its efficiency in removing water begins to diminish. Mesh becomes clogged . . . less water can get through . . . machine speed must be reduced . . . more heat is needed at the driers.

BETTER CHANGE felts before they are worn to a frazzle. Do it at wash-up time, without breaking into your production schedule.

- From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster, and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

▶▶▶ For the past 25 years, *Arthur Allen Brown* has specialized in the study of forest fire problems and in the development of fire fighting plans and organizations in various forested regions of the United States. Recently, he was named chief of the Division of Fire Control in the Forest Service of the U. S. Department of Agriculture to succeed David Parker Godwin, former chief who was killed in an airplane crash (Cf. P. I. and P. W., August, 1947).

◆

▶▶▶ Retirement of *Thomas H. Stirling*, manager of the West Virginia Pulp and Paper Company (Mechanicville, N. Y.) for 40 years, has been announced. He entered the employ of the paper company in 1899.

◆

▶▶▶ Promotion of *Robert P. Green* from the engineering department to the position of assistant to the sales manager has been announced by the E. D. Jones & Sons Company, Pittsfield, Massachusetts.

◆

▶▶▶ At a meeting of the trustees of the Kieffer Paper Mills (Ewing, Indiana), *Edna S. Robertson*, assistant treasurer, was appointed general manager succeeding J. E. Kieffer. *Elmer F. Darlage*, plant superintendent, was promoted to general superintendent, and *Tom P. Kieffer* to the office of assistant manager and personnel director.

◆

▶▶▶ A longtime papermaker at the Crossett Paper Mills, Crossett, Arkansas, *Robert W. Burnett*, has been named paper mill superintendent. *A. B. Moore*, former director of technical service, has been appointed assistant paper mill superintendent, and *A. W. Duskin* has been named director of technical service.

◆

▶▶▶ The new industrial engineer at the National Paper Products Company, Carthage, New York, is *Emmett W. Zabriskie*. He was recently associated with the Davidson Chemical Company of Baltimore.

◆

▶▶▶ Washington state director of licenses, *Harry C. Huse*, has resigned to become director of public relations and to do purchasing and selling work for the Pacific Paperboard Company, Longview, Washington.

◆

▶▶▶ Associated with Rayonier, Incorporated, as plant engineer at the Fernandina, Florida, division since 1946, *Russell F. Erickson* has been appointed assistant resident manager of that division. From 1940 to 1945, he was plant engineer for the Hollingsworth & Whitney Company at Mobile, Alabama. He had also spent several years with George F. Hardy Company, a consulting engineer firm.

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▶▶▶ *Nelson J. Leonard*, a Navy officer in World War I, an Army transport officer in World War II, and well known in shipping circles for his materials handling knowledge, has been placed in charge of the Elwell-Parker trucks, tractors and cranes account for the Colby Steel & Engineering Company, Seattle, Washington.

◆

A. H. SMITH ELECTED VICE PRESIDENT & DIRECTOR OF MONSANTO (CANADA) LTD.

Arnold H. Smith, acting managing director of Monsanto (Australia) Pty. Ltd., has been elected vice president and member of the board of directors of Monsanto (Canada) Ltd. to fill the vacancy which will arise when Irving C. Smith becomes assistant general manager of the Monsanto's Western Division on January 1, 1948.

Since joining Monsanto in 1922, Arnold H. Smith has served in the Rubber Service Laboratories (Akron, Ohio), with Monsanto Chemicals Ltd. in London and on the continent, as petroleum chemicals sales manager in St. Louis, and as director of the foreign department.

Irving C. Smith came to Monsanto in 1944 when I. F. Laucks, Ltd. was purchased by the company. He was elected vice president of Monsanto (Canada) Ltd. in 1946.

◆

▶▶▶ Formerly associated with Goodyear Tire & Rubber Company, *Dr. Alvin M. Borders* has joined the staff of The Institute of Paper Chemistry according to a recent announcement. His duties will include teaching and research in the applications of physical chemistry to the pulp and paper industry.

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▶▶▶ In charge of the mill safety program in addition to his duties as chief electrician, *James Godrey, 72*, has been retired on pension by the Byron Weston Company, Dalton, Massachusetts, after 38 years of service.

◆

▶▶▶ The appointment of *William N. Kline, Jr.* as manager of its branch office in Charlotte, North Carolina, has been announced by Stein, Hall & Company, Inc., New York. Mr. Kline has been associated with the company since 1929 as a chemist and assistant manager.

▶▶▶ *John M. Glaze* has been transferred to the New York sales office of the Hooker Electrochemical Company. During the past year he had been associated with the sales department of the home office in Niagara Falls. Mr. Glazer joined Hooker in 1942 as a research process foreman and has also worked with the purchasing department.

◆

▶▶▶ *Charles S. Sliter* has been appointed assistant general sales manager for the Kellogg Division of the American Brake Shoe Company (Rochester, N. Y.), according to a recent announcement. Mr. Slitter, who was formerly sales promotion manager, first joined the company in 1940. In his new position he will continue to direct promotional and advertising activities of the division.

◆

▶▶▶ The appointment of *William H. Allen* as sales manager for the Carton Division of United Paperboard Company, Inc., New York City, was announced recently. Mr. Allen's experience in the folding carton field includes fourteen years with the Sutherland Paper Company and three years with the Empire Box Corporation as sales manager.

◆

▶▶▶ *Samuel D. Hodge*, superintendent of the United Paperboard Company at Thomson, New York, is leaving the paperboard company to take a similar position with the National Folding Box Company in New Haven, Connecticut.

◆

▶▶▶ Connected with the Holyoke, Massachusetts, branch of Paper Makers Chemical Department, Hercules Powder Company, Inc., since 1940, *Thomas S. Morse* has been promoted to assistant to W. P. Campbell, director of development of the Paper Makers Chemical Department at Wilmington, Delaware. Mr. Morse was previously a technical service engineer.

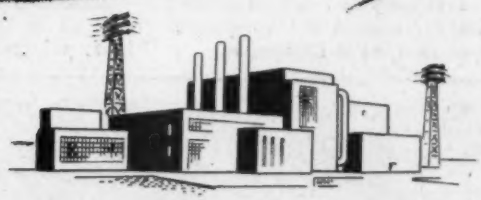
◆

▶▶▶ Announcement has been made of the election of the following new officers of the Ward Paper Company, Merrill, Wisconsin: *Joseph Regenstein*, Chicago, chairman of the board; *David B. Smith*, Merrill, president; *Robert S. Hartman*, Chicago, vice president; *Carl H. Luth*, Merrill, secretary; and *Gorden McNown*, Merrill, treasurer.

◆

▶▶▶ *Charles F. Booth* has been appointed a senior research chemist at Monsanto Chemical Company's Central Research Department at Dayton, Ohio, and will be engaged in inorgan-

for greatest efficiency...



Entrust Your Complete Piping System Job to Experts

THE fabrication and erection of a lastingly efficient and reliable piping system requires a distinctive engineering technique, specialized manufacturing facilities, broad experience in diversified piping applications, and skill in meeting and solving present-day erection problems.

These requirements are met when you place your complete piping job in the hands of P. P. & E. Our responsibility begins with the blueprint and ends only when the system is in operation.

Sub-assemblies are shop fabricated under ideal conditions, stress-relieved, pressure-tested, checked for dimensional alignment, cleaned and inspected, and shipped ready for accurate assembly. Field erection, which is done by skilled, specially trained craftsmen, is thereby expedited.

By entrusting the complete piping system to P. P. & E. you obtain greatest efficiency—in its manufacture, erection, and operation. There's a P. P. & E. system in your neighborhood. Our nearest representative will give you further information.

Pittsburgh Piping

AND EQUIPMENT COMPANY

10 Forty-Third Street—Pittsburgh, Penna.

Woolworth Building, New York
Chamber of Commerce Bldg., Indianapolis
Book Tower, Detroit
525 Market Street, San Francisco
Peoples Gas Building, Chicago
Public Square Building, Cleveland
10 High Street, Boston
Heights State Bank Bldg., Houston
Whitehead Building, Atlanta

ic chemical research. Mr. Booth had previously served as research group leader at Anniston, Alabama, from 1930 until 1945 and later as a principal chemist in atomic energy research at the Clinton Laboratories (Oak Ridge, Tenn.) until his present transfer.

◆

▶▶▶ A member of the Chain Belt Company, Milwaukee, since 1937 *David B. Hill,* has been appointed district field engineer in the Atlanta office. Previously he had been an application engineer in the company's Conveyor Division at Milwaukee.

NECROLOGY

GEORGE FISKE HARDY

Head of the widely known firm of George F. Hardy & Son, consulting engineers, George F. Hardy passed away October 2 in New York at the age of 82.

Since 1932, Mr. Hardy had been engaged in the development of the kraft pulp and paper industry in the Southern States. He designed mills in Georgia, Florida, and Louisiana. Outstanding among his activities was his designing of the Southland Paper Mills, Inc., at Lufkin, Texas.

Mr. Hardy was born in Poquonock, Connecticut. He was graduated from Dartmouth College in 1888. He was originally employed as an engineer by D. H. and A. B. Tower, of Holyoke, Massachusetts, specialists in pulp and paper mills. Later, he became a junior member of the firm under the name of A. B. Tower & Company. He left the company in 1896 to build a mill for the Hudson River Pulp and Paper Company, Corinth, New York. The following year he built a newsprint mill for the Laurentide Paper Company, Grand Mere, Quebec.

When the major newsprint mills of the United States were merged into the International Paper Company, Mr. Hardy became chief engineer. He left this post three years later to return to the Tower Company as its head, after the company had moved to New York. He subsequently founded his own firm.

Several power plants were designed by Mr. Hardy, including the 250,000 hp. hydroelectric plant at Abitibi Canyon, Ontario.

Surviving are two sons, George F., Jr., and John A. Hardy. His wife passed away in 1925.

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▶▶▶ Vice president and treasurer of The Biggs Boiler Works Company, Akron, Ohio, *F. G. Sherbondy,* passed away September 11. He had been associated with the Biggs organization for 45 years.

◆

JOSEPH EMORY SIRRINE

Head of J. E. Sirrine and Company, Greenville (S.C.), Joseph Emory Sirrine, 75, passed away August 8 at his home in Greenville. Following graduation from Furman University in 1890, Mr. Sirrine went into civil engineering work, continuing until 1895 when he joined Lockwood Green and Company.

Mr. Sirrine started a private practice as engineer and architect in 1902. The present firm is a partnership of eleven members which specializes in cotton textile and pulp and paper mills.

◆

▶▶▶ *John Knight Shryock,* retired paper manufacturer, passed away in Philadelphia August 24 at the age of 75. The last of a family prominent in the manufacture of paper from 1760, he conducted the firm of J. K. Shryock until he retired two years ago. The company was founded by John K. Shryock before the Revolutionary War.

Magnews

Newsworthy Items for Those Concerned with Industrial Cleaning and Related Problems

October, 1947

Increase the Use of Waxy, Inky Furnish with Magnus Beatex to Disperse It!

If you'd like to use more furnish, but find that troubles with spotting and discoloration due to wax, ink, etc., hold you back—try Beatex. The addition of 1/3 lb. of Magnus Beatex for each 1000 lbs. of furnish is ample for the effective dispersal of its foreign matter, so that blemishes are prevented.

Addition is usually made to the beater after the furnish has been charged, though equally satisfactory results are obtained by adding the Beatex before charging the furnish.

Beatex does not form any free alkali in solution and does not affect the pH of the stock. It is completely compatible with all materials in furnish or sizing.

Lime in Felts Causing Slow-Downs?

Magnus D-Scale-R offers a sure, fast and safe way of reconditioning limed felts, no matter how bad the condition. This inhibited acid cleaner is easy to apply and easy to rinse. Does a quick, thorough job of dissolving out the lime. Can be followed by reconditioning with a suitable Magnus Felt Conditioner to restore full softness and nap.

Lubricate Your Size with Magnus 58

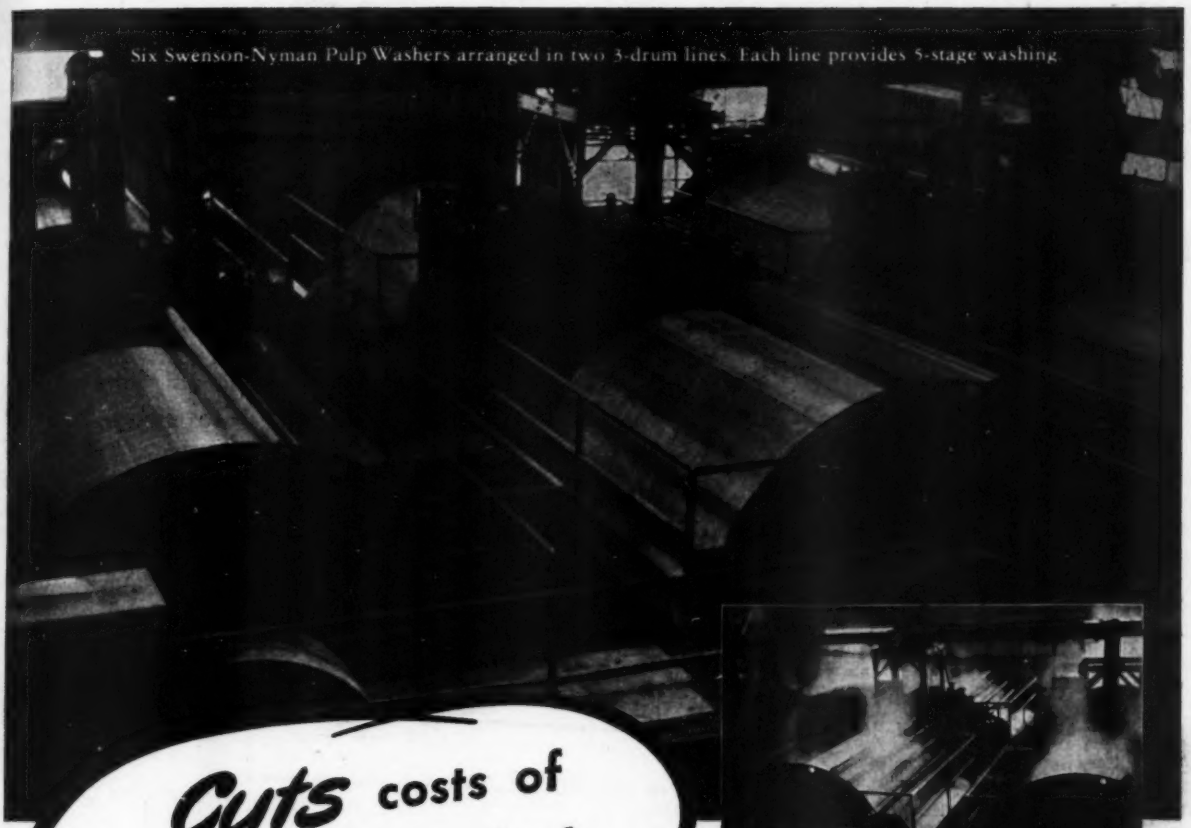
If sticking of size to calender rolls gives you any trouble, a simple, effective cure is the use of this high titer neutral soap, added in small amounts to the size mix. On a starch size carrying 50 lbs. of size to 175 gals. of water, 2 lbs. of Magnus 58 does a perfect job of lubrication.

Compatible with all types of sizes, this soap is unusually valuable on casein mixes, where it not only stops sticking, but closes pin holes and eliminates smearing.

Magnus Chemical Co., 192 South Ave., Garwood, N. J. In Canada—Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que.

WITH THE PAPER MILL IT'S Magnus

CLEANERS • EQUIPMENT • METHODS



Six Swenson-Nyman Pulp Washers arranged in two 3-drum lines. Each line provides 5-stage washing

Cuts costs of chemicals and fuel

The same installation in operation. Output over 400 AD tons per 24 hours.

Scientific advances in pulp washing with Swenson-Nyman Equipment have reduced chemical losses to less than 40 lb per ton of A. D. pulp—only the amount carried away in the pulp itself. This multi-stage washing also reduces dilution and eases the evaporator load.

After equipment is installed, Swenson engineers assist in determining optimum water rates, drum speeds, washer valve settings, and shower location for the production rate and pulp hardness . . . thus assuring greatest possible economy. It will pay you to investigate.

Close-up view of second and third drums. Each is 9′ diam x 12′ face.

SWENSON

SWENSON EVAPORATOR COMPANY

Division of Whiting Corporation
15653 Lathrop Avenue, Harvey, Ill.
Export Dept., 30 Church Street
New York 7, N. Y.

Write for Pulp Washer Bulletin F-104

KRAFT PULP DECKERS • BLACK LIQUOR EVAPORATORS • LIME SLUDGE FILTERS • BLOW CONDENSERS

FIGURE 2228 LUNKENHEIMER NEW 200 LB. BRONZE UNION BONNET GATE VALVE

DESIGNED WITH FULL CYLINDRICAL BODY SECTIONS to provide maximum resistance against distortion of the valve body and seats due to pipe line stresses and internal pressure strains. Exhaustive tests made under conditions far more severe than those encountered in actual service clearly demonstrate that this design will not distort and will maintain initial proportions and seat tightness.

All parts are heavy and rugged and of the finest materials to insure ample factors of safety against pressure, temperature and operating strains.

Send for descriptive circular No. 534.

BUILT TO LUNKENHEIMER STANDARDS FOR BETTER SERVICE

NOTE THESE FEATURES

Malleable Iron Handwheel—Non-heat, easy, comfortable grip.

Rising Stem—Made of a distinctive silicon bronze alloy, developed and patented by Lunkenheimer. Remarkably wear-resistant, eliminates stem-thread failures. Exceptionally heavy stem head.

Hexagon Head Gland—Permits use of a wrench to loosen gland. Facilitates repacking.

Stuffing Box—Large and deep. Long thread provides solid engagement with packing nut to form a tight joint when fully packed.

Repacking Seats—Repackable under pressure when wide open. Repacking seats above stem thread, perfectly machined.

Bonnet—Union bonnet 2 in. and smaller; bolted bonnet 2½ in. and 3 in. Both provide a strong, tight joint; easily disassembled.

Body—Made of high grade bronze which meets the A.S.T.M. Specification B-61. Heavy, rugged proportions and straight through full flow areas.

Double-Wedge Disc—Nickel alloy, ball and socket bearing; no internal wedge or pin. Discs readily adjust themselves to taper seats, insuring a tight valve.

Stay-On Discs—Will not drop off stem when assembling valve. Bevelled disc wing guides and body channels make assembly easy.

PHONE YOUR LUNKENHEIMER DISTRIBUTOR

Fig. 2228 valves and companion valves are available through your Lunkenheimer Distributor. Call on him for prompt service and the best in valves—Lunkenheimer.

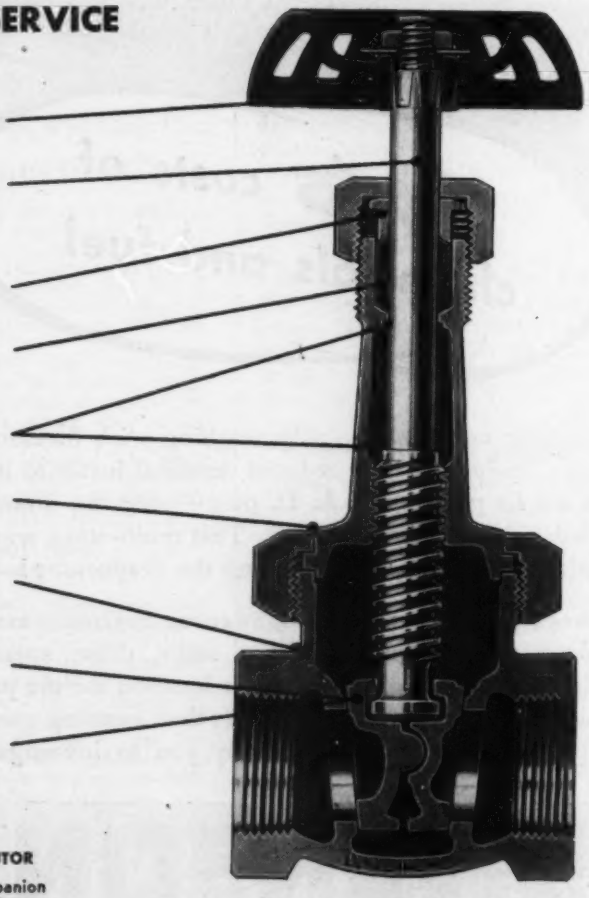


Fig. 2228

ESTABLISHED 1862

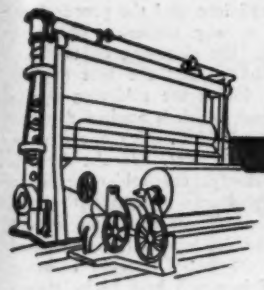
THE LUNKENHEIMER CO.

"QUALITY"

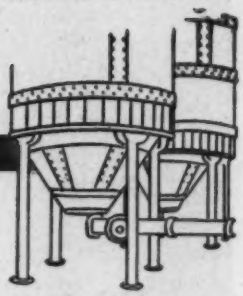
CINCINNATI 14, OHIO, U. S. A.

NEW YORK 13 CHICAGO 6
BOSTON 10 PHILADELPHIA 34

EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

First-Aid Treatment for Caustic Soda Burns

The following general first-aid instructions will serve to reduce the seriousness of accidental contact with caustic soda. Specific treatment should be at the direction of a physician.

1. Immediate action in case of contact of any part of the body with caustic soda is imperative. Delay increases the seriousness of a burn, while prompt attention may prevent or materially reduce the degree of injury.

2. A thorough flushing with plain water is the first step for any part of the body. The water should be used in ample quantity, such as from a spray shower. The use of small portions of water, such as by sponging, may cause more serious injury due to the heat liberated on dilution of concentrated solutions. Clothing that has been in contact with caustic soda should be removed before flushing the body with water.

3. After flushing with water, use liberal quantities of a neutralizing solution such as:

For body burns: 10% solution of boric acid, citric acid or ammonium chloride.

For mouth or lip burns: 2% solution of boric acid, citric acid or ammonium chloride.

For eye burns: 2% solution of boric, or citric acid, or 1% solution of ammonium chloride.

Note: Ammonium chloride causes a smarting of the affected part due to the liberation of ammonia. When no more smarting is felt on additional application, the caustic soda has been neutralized. Treatment with ammonium chloride solution for the eyes, mouth, or lips should be followed with an irrigation with a 2% boric acid solution.

4. Call a doctor and obtain prompt medical attention.

5. Do not pull or remove burned tissue, especially from the eyes or eyelids.

Showers

Spray showers should be located at readily accessible points within the working area. They should be equipped with a fast operating valve operated by a chain or cord, by a foot pedal, or a single throw hand operated lever. Painting them a distinguishing color, or prominently marking their location by means of a sign or colored light, is advisable. They should be kept in working order at all times and tested daily.

First Aid Cabinets

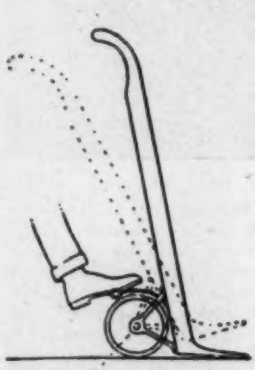
First-aid cabinets should be located at strategic points within the working area and prominently marked by means of a sign or a colored light. They should contain a half-gallon of body and eye wash solutions in glass bottles, an eye glass, and a glass tumbler. The body and eye wash solutions should be labeled with at least ½-inch letters on a contrasting background. Daily inspection should be made to see that the equipment is clean and that the solution bottles are filled.—PITTSBURGH PLATE GLASS COMPANY, COLUMBIA CHEMICAL DIVISION.

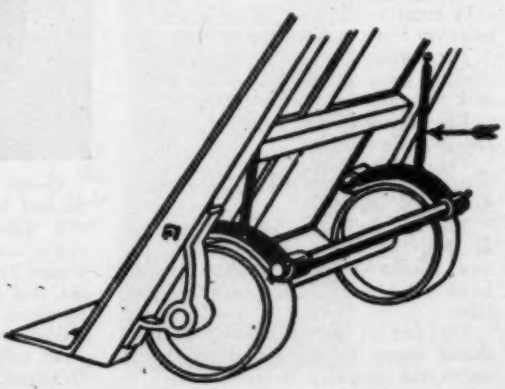
◆

Hand Truck Foot Brake

The foot brake for the wheels of a hand truck, as illustrated, is a simple device which permits the operator to brake both wheels at the same time. The brake can be shaped from any suitable strapping material and is attached to the truck frame by bolting and through the use of two springs. In applying the brake, the operator stands directly in back of the truck and brings the brake into braking position with pressure from one foot.

The use of the brake prevents a truck from kicking back against an operator in the lifting of a load from the floor with the nose of the truck and then balancing it into position on the truck frame by pulling back on handle or handles.—Illustration from *Handbook of Industrial Safety Standards*, NATIONAL CONSERVATION BUREAU.





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Maintaining Safe Water-Level

The first law of the boiler room always has been and always will be to maintain safe water level inside the shell or drum. Modern automatic water level indicators and regulators may assist in performing this all-important function, but the water column and the try-cocks (gage-cocks) continue to be the reliable source of information on water level. Automatic equipment saves the operating engineer considerable time, but they are mechanical devices and are subject to break-down and/or failure to function properly. To assure safe operation they must be checked frequently during the shift.

There is a tendency to disregard try-cocks and this neglect frequently results in their being unusable when badly needed. Unless checked periodically, this condition is not discovered until some fine day the water has dropped out of sight in the glass. Then when an attempt is made to open the try-cocks, they have become inoperative. To prevent corrosion, gumming-up or sticking, try-cocks should be opened and blown at least once each shift to keep them in reliable readiness. It must be remembered that the try-cocks are the only true water level indicators on the boiler. There is one exception to the advantage of try-cocks as a true water level indicator, and that is on high pressure boilers with an operating pressure of 400 psi and upwards. At these pressures it is very difficult, except for the expert, to detect whether it is water or steam hissing out from the jet when the cock is open.

The water column or gage glass is the next best and most readily available means of checking water levels. It must be blown down frequently (at least once each shift) in order to keep free and clear of possible plugging by mud or scale. A certain amount of attention must be paid to the care of the water gage glasses themselves. They frequently become

etched on the inside due to reaction of chemicals in boiler compound or to a condition of the feed-water itself. It is good practice to remove and carefully inspect all glasses upon such occasions when boiler is down for cleaning or repairs. The bad glasses should be renewed, as the etching greatly weakens their structure. It is much more convenient to renew a glass at that time, before it lets go on a live boiler.

Many water columns are still equipped with globe type shut-off valves. In the event a water glass is fractured or gives way, it is necessary for the operator to grope up through the hot blast of steam in order to close the valves, and renew the glass. He is bound to suffer burns as a result. Greater safety and quicker means of shut-off are obtained by replacing such valves with plug type stop cocks, with permanently fastened levers. These stop cocks require only a quarter turn to close. One is placed at both the bottom and the top of the water column. They can be actuated by long chains or rods suspended from lever arms extending out from each side of the valve stems. Thus the two valves are connected together and should a glass give way the operator need only give either chain a quick yank from arm height and both valves are closed.—*G. E. Coons, District Engineer,* AMERICAN MUTUAL LIABILITY INSURANCE CO.

◆

How to Attach a Wire Rope Socket

1. Measure from end of rope a length equal to basket of socket. Serve at this point with not less than three seizings. Cut out the fiber core but do not cut out wire rope or strand when used as a core. Open strands.

2. Separate wires in strands. Straighten by means of iron pipe. Cleanse all wires carefully with kerosene oil from ends to as near first serving as possible. Wipe dry.

3. Dip wires, for three quarters of the distance to the first seizing, into one-half muriatic acid, one-half water (use no stronger solution) and take extreme care that acid does not touch any other part of the rope. Maintain acid at strength given and do not allow oil to collect on surface. Keep wire in long enough to be thoroughly cleaned. Wipe dry. Serve end so that socket can be slipped over all of the wires.

4. Warm the socket and slip it over wires. Cut top seizing wire and distribute all wires evenly in basket and flush with top. Be sure socket is in line with axis of rope. Place fire clay around bottom of socket.

5. Pour in molten zinc. Use only high grade zinc at a temperature of 850 Fahr. to 880 Fahr. Do not use babbitt nor other antifriction metal, and do not use the dross that may collect on the surface of the zinc bath.

6. Remove all seizings, except one nearest socket. After cooling, preferably slowly, socket is ready for service—JOHN A. ROEBLING'S SONS CO.

◆

Requirements for Good Soldering

In order to do good soldering, it is necessary that the following be observed:

The surface to be joined should be clean, it being impossible to make solder stick to a dirty or greasy surface.

The soldering iron sould be cleaned and properly tinned.

The metals being soldered must be heated in order that the solder will adhere to the surface.

The surfaces being joined should be as close together as possible, with the least amount of solder between the surfaces. Too much solder means a poor joint.

The area of the joint being soldered should always be comparatively large to secure the necessary strength. With a properly tinned iron and the proper flux, the success of any soldering operation depends upon the cleansing of the surfaces to be joined and the heat applied to the joint during the soldering operation. The heat which is applied depends upon the speed with which the iron is drawn along the joint. If the iron is moved too slowly, the solder tends to spread too much and if moved too rapidly, the solder will not have time to melt completely and the joint will not be filled with solder. If heavy material is being soldered, the iron will have to be moved more slowly than if the metals being joined are metals whose melting point approaches that of solder. When using an extremely heated iron, the position of the iron is varied as the work progresses. When starting, the point of the iron is used. As the iron cools, it is lowered so that more of the flat tinned surface of the point is in contact with the work. This is not so important with electric irons, as the heat does not vary so greatly if properly used. Shop Work (TM 11-453) WAR DEPARTMENT TECHNICAL MANUAL.

◆

Simple Scheme Protects Newsprint Rolls Against Shift-Damage in Transit

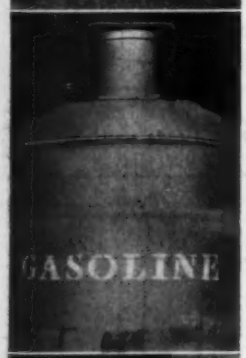
Old automobile tires have been found to serve as excellent shock absorbers in protecting newsprint rolls against damage from shifting in railroad cars while in transit. In using them, one tire is nailed flat against the end wall of a car at approximately the center of the roll that is to be contiguous to it. In this way, when a car receives a sudden shock, the rolls are cushioned against damage in their shifting against the end walls.

Known as the McKerron method (named for its originator, J. O. McKerron, general traffic manager, Abitibi Power and Paper Co), the scheme, although comparatively only a few months old, has proved to be unusually satisfactory in minimizing, if not entirely eliminating, the damage common to newsprint rolls in railroad shipment.—PHIL GLANZER.

How to Light Your Blow Torch

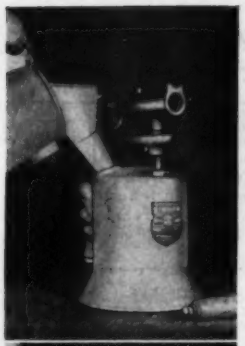
1. First, make sure that all working parts are in good order. A little oil on the pump plunger will run into the cylinder and lubricate the pump leather.

2. The packing nut should be tight enough to prevent leakage — but not tight enough to bind.



3. Good, clean, uncolored, unleaded gasoline is essential to long, carbon-free operation.

4. Now let's fill 'er up. If the torch is a "bottom fill," here's how.



5. Remove the pump for filling on a "top fill." Be sure that the pump is wiped clean before replacing.

6. Be sure that the needle valve is closed. Then pump about 30 strokes for starting pressure.

7. "Priming" is next. With a torch that has a priming valve, it is very simple. Just open the valve until the drip cup is filled—then shut it off.

8. If your torch does not have a priming valve, just hold your hand over the nozzle, open the needle valve, and the gasoline will run back into drip cup. Shut off needle valve.

9. For safety's sake always wipe off any gasoline that may have run down into the tank.

10. Now—light the gasoline in the drip cup.

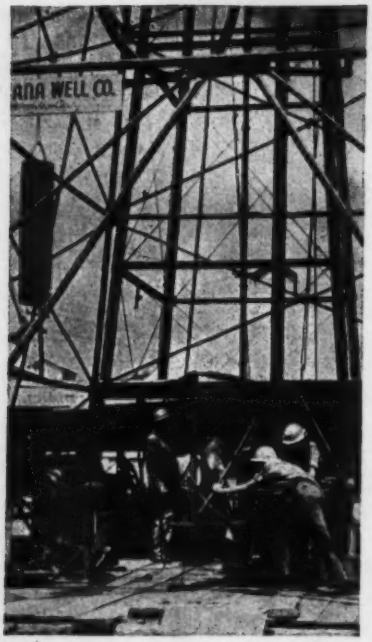
11. Be sure that the torch is out of any possible drafts. Then the burner gets the full effect of the generating flame—like this.

12. Open the needle valve just before the drip cup has "burned dry." Hold a match to the nozzle if it is necessary to ignite the vapor.

13. Pump 'er up to the pressure that gives the desired flame volume. It won't need much!

14. When you've turned the torch off, back out the needle valve about ⅛ turn to prevent jamming when the torch cools.

—The Turner Brass Works.



4 LAYNE UNITS FOR

W. MONROE, LA.

The city of West Monroe, Louisiana will soon have four complete Layne Well Water Supply units and an adequate supply of water to fulfill the needs of a growing and thriving oil metropolis. The first two were bought on confidence in the name Layne . . . but the third and fourth purchases were based upon known knowledge of how Layne Well Water Systems perform.

West Monroe city Officials know the cost of operating these systems, how they keep steadily on the job with little or no upkeep cost . . . and how they fulfill every claim made by Layne.

Layne Well Water Systems are extra rugged in quality and always give complete satisfaction.

For literature address

LAYNE & BOWLER, INC.

General Offices, Memphis 8, Tennessee

6 pumps for wells, lakes, rivers, reservoirs, irrigation—or for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute. Write for Layne Pump Catalog.

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WELL WATER SYSTEMS

vertical turbine pumps

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Wash. * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minn., Minneapolis, Minn. * International Water Supply Ltd., London, Ont., Can. * Layne-Hispano Americana, S. A., Mexico, D. F.

Convention Papers . . . Abridged

Abridgments in this section are from papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry** held in New York City, February 24-27, 1947

Evaluation of 9-Point Straw for Corrugating

NORVAL F. WILSON, Chairman
TAPPI Committee on Testing Agricultural Residues

This report deals with the testing of 9-point corrugating medium made primarily from wheat straw. The TAPPI Committee on Testing Agricultural Residues was fortunate in obtaining samples from the regular production of a representative group of straw mills. The samples were coded, and then distributed to four laboratories where independent tests were made. The laboratories deserving credit for conducting these tests are those of Alton Box Board Company, Container Corporation of America, Institute of Paper Chemistry and the Northern Regional Research Laboratory.

Table 1

Mill Code No.	Caliper (.001 inch)				
	a	b	c	d	Ave.
1	9.5	9.2	9.3	9.30	9.3
2	9.0	9.5	9.6	8.90	9.3
3	9.0	10.2	9.9	9.54	9.3
4	8.0	8.0	7.9	7.43	7.8
5	10.0	10.2	9.9	9.58	9.9
6	11.0	11.4	11.0	10.30	10.9
7	9.5	9.7	9.4	9.48	9.5
8	11.5	11.3	10.6	10.90	11.0
9	8.5	8.7	8.0	8.28	8.4
				Ave.:	9.4
	Weight per 1000 sq. ft.				
	a	b	c	d	Ave.
1	33	33.5	34.2	33.0	33.4
2	32	30.0	31.1	32.6	31.4
3	33	32.7	32.4	32.1	32.6
4	29	29.5	28.2	29.5	29.1
5	32	32.0	31.4	31.4	31.7
6	32	31.9	31.1	29.9	31.2
7	32	31.4	31.6	31.3	31.6
8	34	34.7	32.3	32.4	33.4
9	31	30.4	29.8	28.2	29.9
				Ave.:	31.6

Tabulation of the test results is based on the averages from each of the four laboratories designated "a, b, c, and d."

Table 1 shows close agreement on caliper and weight.

Table 2 represents the edgewise com-

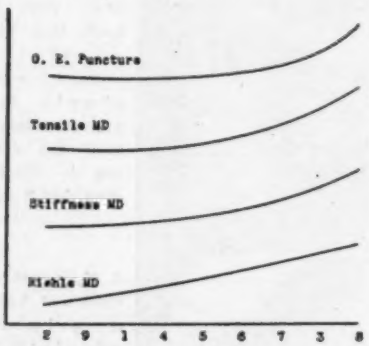

Figure 1 (Mill code numbers)

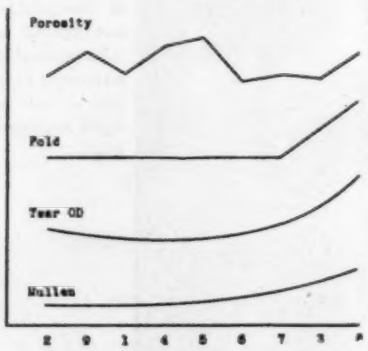

Figure 2 (Mill code numbers)

Table 2
Edgewise Compression (Riehle)

Mill Code No.	MD				OD			
	a	b	c	Ave.	a	b	c	Ave.
1	18.2	17.9	18.0	18.0	11.4	12.0	15.4	12.9
2	16.1	15.5	16.5	16.0	11.2	10.5	12.4	11.4
3	18.2	19.7	16.4	18.1	11.8	12.4	13.9	12.7
4	17.0	17.3	16.9	17.1	11.2	11.4	10.9	11.2
5	18.9	20.4	19.3	19.5	13.5	14.4	14.8	14.2
6	19.0	16.8	19.1	18.3	10.2	9.4	11.5	10.4
7	18.7	18.2	18.4	18.4	14.7	10.3	11.7	12.3
8	19.2	21.7	21.2	20.4	9.7	8.9	12.0	10.2
9	17.1	15.5	17.7	16.4	15.2	12.5	12.4	13.4
				Ave.: 18.0				Ave.: 12.1

Mill Code No.	Bursting Strength (Mullen—lbs.)					Beach Puncture		
	a	b	c	d	Ave.	b	c	Ave.
1	33	23.5	30	18.3	26.2	6	9.0	7.5
2	32	22.8	28	17.9	25.2	6	9.0	7.5
3	30	25.4	33	22.5	27.7	8	8.4	8.2
4	29	26.5	32	23.9	27.6	6	10.0	8.0
5	30	26.2	26	21.7	26.0	6	8.3	7.1
6	24	21.4	27	16.9	22.3	8	10.3	9.1
7	29	26.2	28	22.2	26.4	7	8.1	7.5
8	37	34.7	39	30.3	35.2	11	12.3	11.7
9	29	22.7	28	20.7	25.1	6	7.9	7.0
				Ave.:	26.9			Ave.: 8.2

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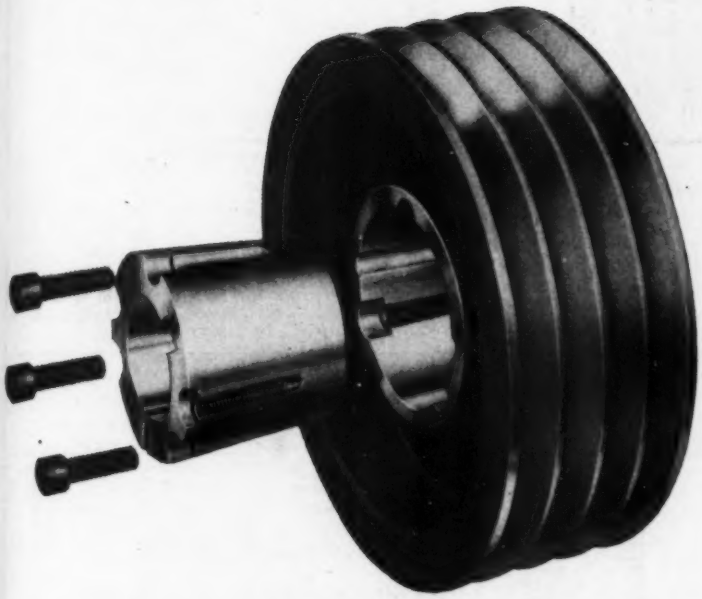

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B	5.4 to 38.0 20.0 to 38.0	7 to 10 2 to 10	76 36
C	9.0 to 44.0	3 to 10	128
D	13.0 to 33.0	4 to 10	77

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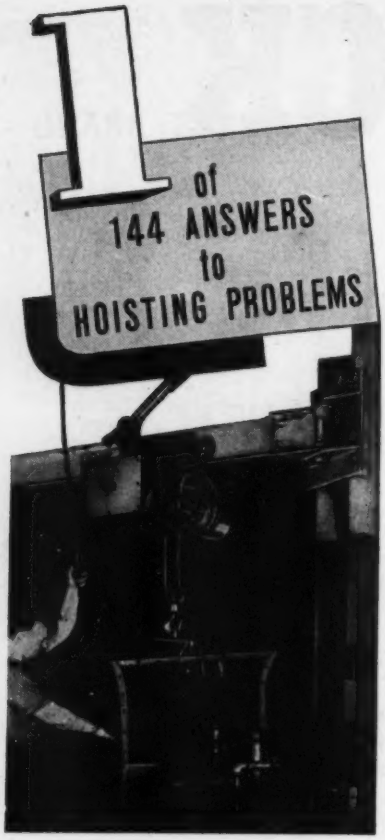

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Table 3

Tensile—1" Width—Pounds

Mill Code No.	MD a	MD b	MD c	MD Ave.	OD a	OD b	OD c	OD Ave.
1	22.0	24.3	21.5	22.6	12.0	13.0	13.4	12.8
2	23.4	24.9	20.8	23.3	8.6	8.6	8.7	8.6
3	23.3	28.4	25.7	25.8	13.2	14.8	13.8	13.9
4	24.6	23.4	23.3	23.8	9.4	9.5	9.1	9.3
5	26.0	29.9	25.0	27.0	9.4	9.5	9.4	9.4
6	25.4	29.3	24.7	26.5	6.5	7.0	6.8	6.8
7	29.0	32.4	27.2	29.5	9.6	10.3	10.2	10.0
8	42.6	42.1	37.1	40.6	10.6	9.7	9.1	9.8
9	21.8	28.7	25.5	25.3	9.8	10.0	10.0	9.9
				Ave.: 26.0				Ave.: 10.1

Per Cent Elongation 1" Width

	MD a	MD b	MD Ave.	OD a	OD b	OD Ave.
1	.5	.9	.7	1.8	1.8	1.8
2	.7	1.0	.9	.8	.9	.9
3	.7	1.0	.9	1.8	2.2	2.0
4	1.0	.3	.7	1.3	.6	1.0
5	.8	.9	.9	1.0	.6	.8
6	.8	1.2	1.0	.6	.9	.8
7	1.0	1.1	1.1	2.0	1.7	1.9
8	.8	1.1	1.0	1.8	2.0	1.9
9	.7	1.1	.9	1.3	1.0	1.2
			Ave.: .9			Ave.: 1.3

Table 4

Stiffness (Taber)

Mill Code No.	MD b	MD c	MD Ave.	OD b	OD c	OD Ave.
1	16	16.3	16.2	6.7	8.0	7.4
2	14	16.4	15.2	5.4	5.8	5.6
3	19	17.5	18.6	7.7	7.8	7.8
4	15	13.6	14.3	5.0	4.7	4.9
5	19	19.5	19.4	5.9	7.3	6.6
6	23	21.9	22.6	5.2	6.6	5.9
7	20	20.1	20.2	5.1	5.8	5.5
8	34	27.8	31.0	6.2	5.3	5.8
9	15	14.6	14.8	5.5	6.2	5.9
			Ave.: 19.1			Ave.: 6.2

Elmendorf Tear (Gms.)

	MD a	MD b	MD d	MD Ave.	OD a	OD b	OD d	OD Ave.
1	64	64	59.8	62.6	80	75	69.1	74.7
2	64	56	67.5	62.5	80	92	75.5	82.5
3	80	77	74.9	77.3	80	89	77.8	82.3
4	48	56	48.0	50.7	64	73	62.1	66.4
5	48	54	55.4	52.5	64	75	67.2	68.7
6	64	85	72.3	73.8	112	129	101.0	114.0
7	64	66	64.0	64.7	80	87	78.7	81.9
8	96	103	113.0	104.1	160	158	149.0	155.7
9	64	65	61.8	63.6	80	80	69.4	76.5
				Ave.: 68.0				Ave.: 77.8

Table 5

Mill Code No.	Porosity, Sec./100 cc. (Gurley) a	Porosity, Sec./100 cc. (Gurley) b	Porosity, Sec./100 cc. (Gurley) Ave.	Per Cent Straw a	Per Cent Straw b	Per Cent Straw Ave.
1	17.5	23	20	96	95	96
2	16.3	22	19	93	80	87
3	19.3	17	18	96	95	96
4	33.9	38	36	97	90	94
5	37.7	50	44	95	80	88
6	15.3	15	15	88	80	84
7	20.1	15	18	96	90	93
8	37.5	31	34	76	55	66
9	39.1	31	34	94	85	90
			Ave.: 27			Ave.: 88

Folding Endurance M.I.T.

	MD a	MD b	MD Ave.	OD a	OD b	OD Ave.
1	6	1	4	5	3	4
2	13	4	9	5	3	4
3	30	5	18	10	7	9
4	12	2	7	6	4	5
5	10	2	6	4	2	3
6	41	14	28	4	3	4
7	9	5	7	6	2	4
8	52	46	49	10	4	7
9	10	4	7	8	3	6
			Ave.: 15			Ave.: 5

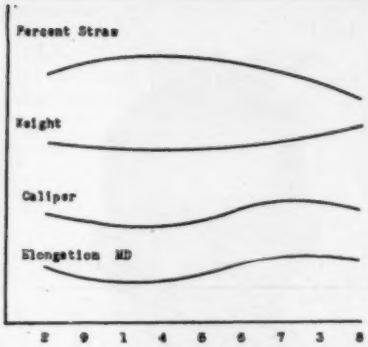


Figure 3 (Mill code numbers)

pression test (Riehle) as reported by three laboratories.

Table 3 gives tensile and elongation based on one inch width samples.

Table 4 contains average test values which agree very well on stiffness and tearing strength.

Table 5 includes porosity, folding endurance and per cent straw. The fiber other than straw is usually waste paper or selected kraft waste.

Figure 1 is a graph of Riehle, stiffness, tensile and Beach puncture values with the order of the nine mills re-arranged as shown on the base line. It can be seen that the samples tend to increase in strength consistently for all the important tests.

Figure 2 pictures the Mullen, tear, fold and porosity. The Mullen values are somewhat similar to puncture shown in Figure 1. Tear and fold have little significance and porosity shows no relationship to other tests, although the laboratory reports agreed fairly well.

Figure 3 is interesting because it shows the tendency for elongation to follow the caliper. Weight and caliper curves suggest that no particular improvement in the physical tests can be attributed to differences in density caused by unusual calendering. Where the percentage of fiber other than straw is high, the weight is correspondingly higher.

Figure 4 is a comparison of G. E. Beach Puncture and Mullen using one good grade of 9-point straw in a series of sandwich tests to determine whether more accuracy could be had with multiple plies. The results are close to straight line functions and it appears that sufficient accuracy can be obtained with a single sheet.

A study of the various curves for physical tests together with the table of test averages will enable each mill to evaluate its product in relation to the

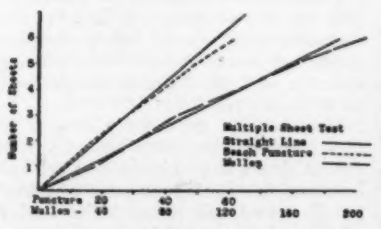
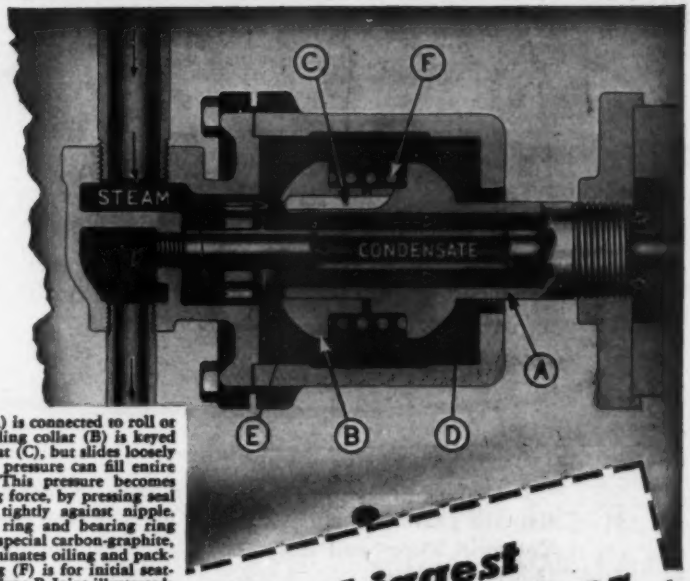


Figure 4



Nipple (A) is connected to roll or drum. Sliding collar (B) is keyed to nipple at (C), but slides loosely over it so pressure can fill entire housing. This pressure becomes the sealing force, by pressing seal ring (D) tightly against nipple. Both seal ring and bearing ring (E) are of special carbon-graphite, which eliminates oiling and packing. Spring (F) is for initial seating only. Type B Joint illustrated; other types, sizes for all needs.

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others. This report covers the samples submitted, but does not necessarily indicate that regular production of any mill will continue to be the same. All of the samples have some desirable qualities, and all of them will make acceptable corrugated board. The objective is to improve the stiffness of 9-point straw produced at a standard weight and caliper. When this is accomplished while using a high percentage of straw in the furnish, it is certain that some progress has been made in handling the basic material.

Repulping of Melamine Resin-Treated Wet-Strength Paper

DONALD D. NIEMEYER[1] and LOREN V. FORMAN[2]

Various experimental repulping procedures were applied to melamine resin wet-strength broke to demonstrate their effect on the quality of the stock produced and to obtain data that would be of value in commercial operations. The procedures consisted of (1) soaking the paper before defibering in a beater; (2) cooking the broke in pressure vessels; (3) exposing the paper to high temperatures and humidities; (4) cutting the paper into small particles followed by beater treatment; (5) defibering with a disk refiner or a rod mill; and (6) cooking the wet strength broke with wood chips by the kraft process.

(1) Research Assistant; (2) Research Associate, The Institute of Paper Chemistry.

In addition to tests performed with several laboratory procedures, data were obtained on the operation of a commerical installation of the Steam Jet Process (Steam Jet Process for repulping wet-strength paper. American Cyanamid Co., Tech. Bull. 18, June 1, 1946) for repulping wet-strength paper.

The laboratory experiments were performed with unbleached kraft wet-strength broke. This was a creped paper which was made for conversion into military tarpaulins. It was supplied by the Mosinee Paper Mills, together with a sample of the same grade of paper made without melamine resin in a run following that from which the wet-strength broke was collected. The melamine resin content of the wet-strength broke was 3.6 per cent, which gave it a very high wet strength.

According to the Thomas patent (U. S. Patent 2,394,273, February 5, 1946), repulping of a wet-strength paper is accelerated by using mineral acid to produce a *p*H of less than 5.0 and a temperature in the range of 160 to 195 Fahr. Because the substitution of alum for the acid represents a more practical operation in a commercial system, this method was applied in the laboratory, using different amounts of alum, as well as of sulphuric acid.

The broke was soaked for 1 hour in sufficient solution to produce a consistency of about 5.5 per cent. The temperature was maintained at about 185 Fahr.

The laboratory Dilts beater was used as a broke beater for defibering the soaked paper. The charge consisted of 6 pounds of paper and enough water to produce a consistency of about 2.5 per cent on the moisture-free basis. With the temperature at 185 Fahr., the suspension was circulated for 30 minutes with the roll in an elevated position. Then the roll was lowered to touching and raised one turn on the handwheel adjustment to give a brushing action. The brushing time in the beater represented the time required to defiber the stock.

The use of sulphuric acid to produce a *p*H in the range of 1.6 to 2.9 in soaking and 2.2 to 3.8 in beating accelerated the repulping so that the time was reduced from 60 minutes for the treatment without acid or alum to 15 to 30 minutes at the lower *p*H. However, the hot acid repulping caused a significant decrease in the bursting strength with a small loss in tearing strength from the values obtained on the repulped paper without melamine resin.

With the same conditions of processing, alum also increased the rate of repulping—45 minutes were required for defibering. This was not as effective as acid but the hot alum-treated broke had a bursting strength of about 80 pt./100 lb., whereas with hot acid the bursting strength was 59 to 72 pt./100 lb.

Since, without the addition of alum to the soaking medium, the *p*H was 3.9, it is evident that a large amount of alum had been used in manufacturing that particular lot of wet-strength paper. The further addition of 4 per cent alum on the weight

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of the paper, during the repulping, caused only a slight reduction in *p*H to a value of 3.6.

Although the hot acid treatment accelerates the decomposition of the melamine resin, the low *p*H would prohibit the use of this method on a commercial scale unless corrosion-resistant equipment were available.

In some repulping systems, the operation is performed at a high temperature but the stock is maintained in an alkaline condition. For this reason, it seemed desirable to study the effect of *p*H on the rate of defibering and the physical properties. The wet-strength paper was processed in the same manner as previously described, except that caustic soda was added during soaking.

The addition of caustic soda in this method of operation to produce a *p*H of about 8.5 increased the time required to defiber the wet-strength paper to 205 minutes. The long period of brushing in the presence of alkali reduced the freeness of the stock to 500 cc. However, at this *p*H, as well as at *p*H 5.0, the repulped paper had better bursting strength than that of the hot acid-treated broke.

It is apparent from these data that a broke system operated under alkaline conditions represents possibly the most unfavorable conditions for the hydrolysis of melamine resin and liberation of the individual fibers in wet-strength paper.

It has been reported by Fromm (*Pulp Paper Mag. Can.* 46, no. 3: 157-160, 164, February, 1945) that cooking wet-strength paper without the addition of chemicals will facilitate subsequent defibering. This method was applied to the tarpaulin paper to determine the approximate cooking condition required and the characteristics of the repulped paper.

Three cooks were made in rotary digesters, in which the total cooking time was 0.5, 1, and 1.5 hours. The maximum pressure of 30 psi was reached 0.5 hour after starting the cook. Enough water was used to give a ratio of 4 cc./g. oven-dry paper.

The cooked paper was transferred to the beater and defibering was performed at room temperature. Because the paper from the 0.5-hour cook retained a high proportion of its wet strength, it was not repulped.

It was found that increasing the cooking time from 1 hour to 1.5 hours decreased the time required for defibering from 2 hours to 1 hour. Disregarding the differences in freeness, the repulped paper from these cooks did not have as high a bursting strength as that obtained for the paper without melamine resin. The stock made from the wet-strength paper after the 1.5-hour cook had a high tear factor.

These cooking and defibering operations produced pulps that had physical properties similar to those obtained with the hot acid treatment in the beater. If a cook were made at a lower *p*H, the decomposition of the melamine resin might have been accelerated, but degradation would probably be more severe. Furthermore, the use of the process on a commercial scale would be limited because corrosion-resistant equipment would be required for the cooking.

Because stationary digesters might be available in some mills for the cooking operation, an experiment was made in the laboratory stationary digester to determine whether the paper could be blown and partially defibered by this means. A water ratio of 9 cc. per gram of oven-dry paper was used so that enough water would be available to provide circulation through the heat exchanger. In a 3-hour cook, the maximum pressure of 75 psi was reached after 2 hours. The digester was blown at the cooking pressure. Although the paper had little wet strength after cooking, only a small amount was blown from the digester at the end of the cook. For this reason, the cooked paper was not defibered in the beater.

Although a cook at 30 psi pressure for a period of 1 to 1.5 hours is necessary to adequately hydrolyze the melamine resin, it might be practical to approach the same result by soaking the paper in hot water. Therefore, the effect of the time of soaking at a temperature of about 185 Fahr. was studied. Soaking periods of 0.5 and 3 hours were investigated.

Good strength properties at a high freeness level were obtained by soaking the

wet-strength paper in hot water for 1 to 3 hours prior to defibering in the beater at elevated temperature. Under these conditions, the freeness of the stock was about 700 cc., the bursting strength was 87 pt./100 lb., and the tear factor varied from 1.59 to 2.12. When the beating temperature was reduced to 75 Fahr., the rate of defibering was such that many clumps of fiber remained after 2 hours of brushing. It would seem, therefore, that an appreciable amount of hydrolysis occurred at the elevated temperature prevalent in the beating operation.

The *p*H during the 1-hour soaking period was 3.9 and during defibering at the lower consistency it was 4.8. Although the *p*H was not determined in the other experiments, it is probable that this type of wet-strength paper contained enough alum to produce an appreciable acidity in each instance. This promoted hydrolysis of the melamine resin. When using a temperature of 185 Fahr., degradation of the cellulose was less than when cooking at a pressure of 30 psi.

The question arose as to whether it might be possible to hydrolyze the melamine resin by exposing the broke to high temperatures and humidities. For the laboratory experiments employing this principle, a vertical digester was used. Ribbons of the broke were placed in the digester and saturated steam was introduced at the bottom of the vessel. The digester was relieved slowly through the top and the condensate which collected in the bottom of the vessel was discharged continuously through the blow valve.

After treating the paper for 5 hours at a digester pressure of 100 psi, it was very brittle, indicating that excessive degradation had occurred. Degradation also was evident when the processing time was reduced to 2 hours. Even with 0.5 hour at this pressure, the bursting strength of the repulped paper was only 33 pt./100 lb. and the tear factor was 0.65.

By lowering the pressure to 5 psi during a 5-hour treatment, somewhat better physical properties were obtained, although defibering was not complete after 2 hours of brushing in the beater at a temperature of 75 Fahr.

With the saturated steam treatment, the moisture content of the paper would probably be relatively low. This would cause a high concentration of the acidic constituents present in the melamine resin-treated paper and severe conditions of hydrolysis. Therefore, the preferred method of processing above a temperature of 212 Fahr. would be to add enough water to soak the paper and thus minimize the loss in the strength properties.

If the laboratory experiments that have been mentioned were to be employed commercially, it would be necessary in most instances to cut the paper before it could be handled satisfactorily and charged to the beater without plugging around the beater roll. This is being done in some mills before it is fed to the defibering equipment. Because there might be an advantage in the ease of defibering if the paper were cut to a small size, the effect of cutting the paper before defibering in the beater at elevated temperature was studied.

An ensilage cutter made by the Eagle Manufacturing Company was used for cutting the dry broke. The standard design of this machine was employed, except for one or two slight modifications. The clearance between the rotary knives and bed knife was much smaller than commonly used for cutting farm crops. Screen plates, having ⅛-, ¼-, or ¾-inch perforations, held the paper in the cutting chamber until the size was reduced sufficiently to be carried through the screen by the air stream of a blower incorporated in the machine. The cut paper was separated from the air and collected by means of a cyclone separator.

The temperature in the beater during repulping was about 185 Fahr. After the beater was charged, the suspension was circulated three hours before the roll was lowered. This period replaced the 3-hour soaking period previously used for paper that was processed without cutting.

Reduction in the particle size of the paper gave repulped broke which had progressively lower tearing strength and bursting strength as the particle size of the paper was reduced. Paper cut with the ⅛- and ¼-inch screens defibered less readily than that made with the ¾-inch screen.

It would seem feasible to cut the paper with a 1.5 to 2-inch screen without materially reducing the strength of the repulped broke. The main advantage in cutting the paper would be in the ease and speed with which the beater could be furnished. Where paper is in the form of slabs, the cutting would separate the sheets and the wetting of the paper would be facilitated by the increased surface exposed to the water. These factors would probably be more apparent in a commercial beater than in the small-scale equipment.

A few trials were made with a disk refiner and a rod mill to determine whether these units would be suitable for defibering the wet-strength paper.

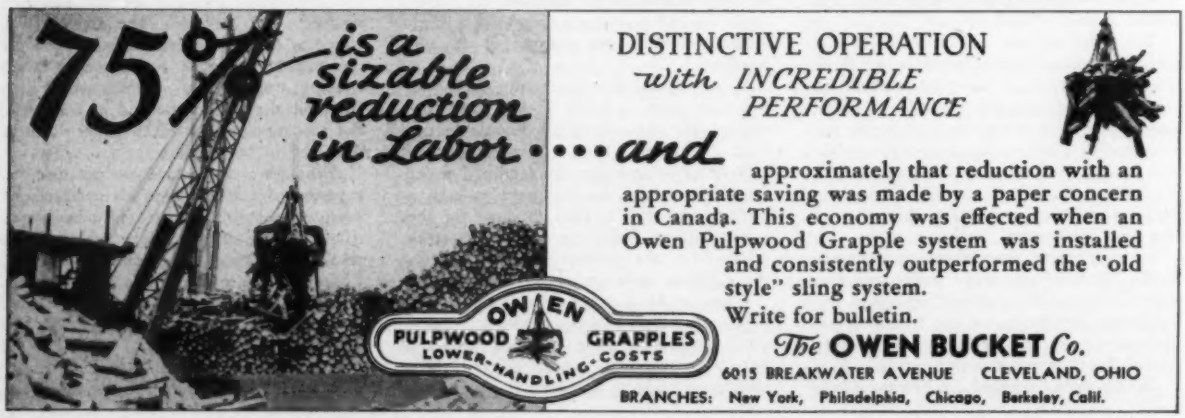
A Bauer pulper was employed which had 36-inch disks driven by 100-hp. motors. The B-950 plates were mounted on the disks. The bars on these plates are approximately ⅛-inch wide and spaced at intervals of about ⅛-inch. The consistency of the material fed to the Bauer was 15 to 20 per cent. Enough water was added just before the paper reached the disks so that the consistency was reduced to 5 to 7 per cent.

Shredded broke was prepared for the Bauer experiments by passing the paper through a hammer mill equipped with a ¾-inch perforated screen plate. After soaking in cold water, the shredded paper was fed to the Bauer with the plates adjusted to a clearance of 0.010 inch. The pulp from this operation was only partially defibered. It was given a brushing treatment in the beater at room temperature but the fiber bundles did not disperse.

In another experiment, the shredded broke was given two successive Bauer treatments after it was slushed in the beater for 0.5 hour at 185 Fahr., and then drained on a screen to increase the consistency of the stock. After the first pass at a plate clearance of 0.008 inch, the pulp had almost the same number of fiber bundles as resulted from the treatment without preliminary slushing in hot water. By adjusting the plates to zero clearance for the second pass, defibering was almost complete. The pulp had a freeness of 735 cc., a bursting strength of 69 pt./100 lb., and a tear factor of 1.71.

The Bauer treatment resulted in flakes of paper that seemed to be reduced in thickness and had the appearance of a group of fibers bound together loosely. However, the brushing action of the beater did not completely separate the fibers.

In treating the broke in the laboratory



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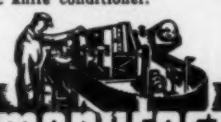

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rod mill, the temperature was about 185 Fahr. and the consistency was 20 per cent. At periodic intervals, the mill was opened to observe the progress that was made in repulping. After 2 hours of milling, chips of paper were present in the stock, although the Schopper freeness of the pulp had been reduced to 310 cc.

It should be emphasized that these experiments were exploratory in nature and, therefore, the results of a more comprehensive study might lead to better processing conditions for the disk refiner and the rod mill which would promote better defibering. Units such as these could probably be used advantageously in combination with other equipment for repulping wet-strength paper.

More drastic alkaline conditions, such as would obtain in a kraft cook, was applied to a mixture of jack pine chips (¾-inch nominal length) and tarpaulin paper which was shredded in the hammer mill. For purposes of comparison, a cook was also made on the wood alone.

The chips were mixed with the shredded paper as they were placed in a stationary digester. Enough paper was added so that it would represent 25 per cent of the pulp produced in the cook, assuming 45 per cent yield on the wood and no loss in cooking the paper. In terms of the total oven-dry charge going to the digester, the paper amounted to 13 per cent of the weight of the wood and paper.

Normal kraft cooking conditions were employed. With a chemical ratio of 19.4 per cent as Na_2O and a sulphidity of 20 per cent, the maximum pressure for the 3-hour cook was 105 psi. The digester was relieved to 80 psi before blowing.

The pulp was washed in the blow pit and screened on a 0.010-inch cut diaphragm screen. The yield and permanganate number (Institute Method 410) were determined. The pulp was evaluated in the 1.5-pound Valley beater (Institute Method 403).

Although the paper was not completely defibered by blowing, the wet strength was reduced sufficiently so that very little paper was present in the screening rejects removed by the 0.010-inch cut screen.

However, some fiber bundles from the tarpaulin paper were visible in the screened pulp. These disappeared after 15 minutes of beating in the standard test beater. At this point, the freeness was 805 cc., which is above the value used for the production of most grades of paper and board.

The olive-drab color of the tarpaulin paper was visible in the pulp. If the method were applied commercially, it would not be feasible to cook wet-strength paper and wood together if the dyes used in the paper remained in the pulp to the extent that the color of other paper products would be affected.

With the same cooking conditions, the permanganate numbers of the pulps composed of 75 per cent wood pulp and 25 per cent repulped paper, and 100 per cent wood pulp agreed closely. In other words, the paper and wood required about as much chemical (based on the weight of material charged to the digester) and the same cooking schedule as were required by the wood alone.

The yield of unscreened pulp from the wood was 45.6 per cent. If it is assumed that the same yield was obtained from the wood fraction when 13 per cent of the digester charge was paper, then the yield of pulp obtained from the paper was 67.2 per cent. This represents a loss in the yield which would probably be greater than for any of the other processes that were investigated.

As previously mentioned, it has frequently been necessary to cut paper before it could be charged to a commercial beater to avoid plugging in the channel around the roll. At a consistency of 5 to 7 per cent and at an elevated temperature, very long periods of slushing often times were not effective in completely defibering the paper. However, by the proper application of these operating conditions, together with the methods described in the Thomas patent (U. S. Patent 2,394,273, February 5, 1946), a new process was developed which represents an economical and convenient method of reusing melamine resin-treated paper. This procedure, designated as the Steam Jet Process (American Cyanamid Company, Tech. Bull. 18, 1946), is the subject of a patent application by the inventors (U. S. Patent Application Serial No. 576,302, assigned to the American Cyanamid Company).

The Steam Jet Process has been used successfully for more than a year in a commercial stock preparation system. Be-

cause it would be of interest to obtain data on the operation of the process in connection with this investigation, the Institute co-operated in an evaluation of a number of normal repulping cycles.

A Niagara-type beater with a capacity of 2,500 pounds of paper had been converted for use of the Steam Jet Process. This involved installation of two 1¼-inch steam pipes through each side of the beater tub at points between the roll and backfall. Attached to the four pipes were nozzles which directed the steam diagonally upward across the beater and approximately parallel to the surface of the backfall. The wood fillers between the bars were protected by means of corrosion-resistant metal strips.

By the introduction of high-pressure steam through the nozzles, the broke was swept over the backfall without plugging the beater. Alum was added at the start of the operation and again while water was introduced with the furnish. The steam raised the temperature of the beater contents rapidly to a value approaching the boiling point of water. This temperature was maintained throughout the cycle. The jets of steam permitted furnishing the beater with large sheets and thick slabs of wet-strength paper without reducing the rate of circulation. Enough paper was added to give a consistency of about 10 per cent, which was much higher than would be feasible if the steam jets were not used. Throughout the operation, the position of the roll was maintained to give a clearance of about 3 inches above the bedplate. The rubbing, tearing, and impact of the paper as it passed the beater roll and the steam jets, defibered the paper progressively as the melamine resin was hydrolyzed in the hot acidic suspension.

The steam flow, steam consumption, and temperatures involved in the Steam Jet Process were determined for a furnish consisting of 50 per cent wet-strength paper and 50 per cent normal broke. The beater was furnished in 27 minutes. Enough alum was added during this period to produce a final *p*H of 3.5. The oven-dry consistency at the time the beater was dropped was 9.1 per cent.

The main steam line pressure was 150 psi and the temperature of the steam was 422 Fahr., which corresponds to about 55 deg. of superheat at 150 psi. The average steam flow rate was less than 5,000 lb./hr. and, during the 32-minute period in which steam was applied, the steam consumption was about 2,500 lb.

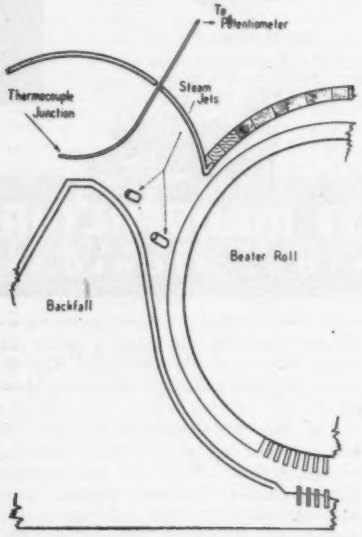

Fig. 2—Cross section of roll and backfall of beater used for the steam jet process, showing nozzle and thermocouple arrangement

Because the highest temperature in the beater probably would be in the region of the backfall where the steam was introduced into the stock, arrangements were made to measure the temperature at this point. A hole was drilled in the hood which permitted insertion of a thermocouple mounted at the end of a ¼-inch pipe. The hole was about 12 inches from the side of the beater. The lower portion of the pipe was curved so that it could be rotated in a circle having a diameter of 20 inches. By this means, it was possible to explore the region from a point near the nozzles to about the center of the beater and, by raising or lowering the pipe, temperatures could be obtained at a point near the hood to a position near the top of the backfall. (See Figure 2.)

Measurements were made immediately after the paper was loaded and before the steam was turned off. It was found that the temperature of the stock was 212 Fahr. at a point close to the backfall and near the end of the steam nozzles. However, near the center of the beater close to the backfall the temperature was 194 Fahr. At other points, the temperature varied from 192 to 203 Fahr. Because this region was not entirely filled with stock as it was circulated by the roll, the thermocouple probably was exposed intermittently to air and water vapor, giving a lower average reading than existed in the beater. This was apparent from the temperatures taken ahead of the roll before the beater was dropped. At a depth of 2 to 3 feet in the central portion of the channel, the temperature was 205 to 207 Fahr.

In the course of using the Steam Jet Process, the wet-strength paper retained satisfactory quality for reuse in the manufacture of paper. By suitable dilution with other stock, the alum used in defibering did not interfere with the normal papermaking operation. In order to obtain further information on the effects of the processing on the pulp quality, a number of laboratory and commercial repulping cycles were evaluated.

During the time that the broke was fed to the beater for repulping with the Steam Jet Process, a representative sample of the paper was removed for laboratory trials.

The sample of broke was repulped by a laboratory procedure selected from those which had previously been used in repulping the tarpaulin paper. From the standpoint of the retention of strength qualities and freeness, one of the best procedures was the 3-hour soak in water at about 185 Fahr., followed by brushing in the beater at the same temperature. Because the defibering of the stock from the Steam Jet Process would be completed at room temperature, the laboratory beating operation was also performed at this temperature, following the soaking at about 185 Fahr. After these conditions were applied to the paper, a second repulping test was made by the same method, except that 2 per cent of alum on the weight of the paper was added in soaking to conform with the practice in the mill.

The laboratory procedure applied to high wet-strength map paper did not disperse all the fiber bundles as effectively as the Steam Jet Process, followed by a brief treatment in the laboratory beater. The prolonged mechanical action applied in the laboratory plus the greater proportion of beating tackle to pulp, emphasizes the unusual effect of the Steam Jet Process in which no fibers are brushed across metal surfaces. However, the steam jets assist the beater roll in imparting a high velocity to the pulp with a resultant high rate of circulation which combine to produce a liberation of the fibers as the melamine resin bonds are hydrolyzed. Furthermore, the steam jets make it possible to obtain an exceedingly high temperature throughout the mass of stock in the open beater which would not be practical if the ordinary methods of introducing steam were employed.

The Steam Jet Process may not directly solve the repulping problem of mills using mixed papers with a small percentage of wet-strength paper. However, by in-

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stalling the jets in the repulping equipment, the usual method of operation could be employed for the mixed waste containing no wet-strength paper. When furnishes are encountered which do not repulp during the usual treatment, the operator could apply steam and alum to complete the defibering.

The Steam Jet Process, without the addition of alum, would represent a rapid means of defibering ordinary sized paper where steam is available for processing.

Abridgments in this section are from papers presented at the annual meeting of **The American Pulp and Paper Mill Superintendents Association,** held at the Edgewater Beach Hotel, Chicago, May 22, 23, and 24, 1947

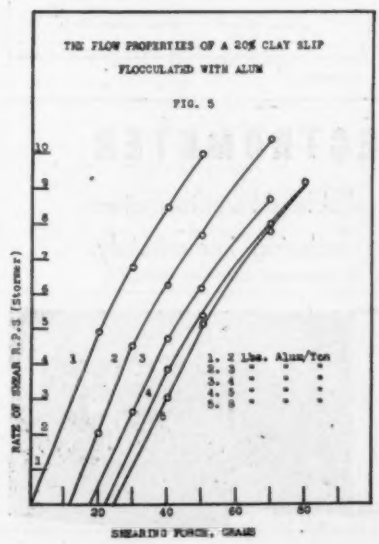
The Dispersion of Coating Clays: Its Relation to the Flow Properties of Clay Slips and Coating Colors

BERNARD K. ASDELL
Edgar Brothers Company

The term "Clay," used in a general sense, refers to a group of naturally occurring minerals composed of hydrous aluminum silicates showing plastic properties and made up of very fine grained crystal fragments. (Grim, Modern Concepts of Clay Minerals, *J. Geol.* Vol. L, p. 246).

In this paper the word "clay" will refer to the grades of domestic clay commonly used by paper mills and composed principally or entirely of the mineral kaolinite.

To the practical coating mill operator the "working properties," or flow properties, of clay as related to the final coating composition are just as important as color and finishing characteristics. This is particularly true in some of the newer high speed coating processes requiring final coating compositions of 60 per cent total solids or higher.


THE FLOW PROPERTIES OF A 20% CLAY SLIP
FLOCCULATED WITH ALUM
FIG. 5
RATE OF SHEAR R.P.S (Stormer)
SHEARING FORCE, GRAMS
1. 2 Lbs. Alum/Ton
2. 3 " "
3. 4 " "
4. 5 " "
5. 6 " "

A clay water mixture is a very complex colloidal system in itself. The same is true of the adhesives used in forming the finished coating colors. The final coating color then is a mixture of two very complex colloidal systems, and only when we have a thorough understanding of each system separately, can we put them together and obtain a mixture which will give optimum results. It is, then, to a practical application of the principles of colloid chemistry that we must look for an elementary understanding of a system as complex as paper coating composition.

I. The Structure of the Clay Particle and the Oirigin of Its Electrical Charge

X-ray diffraction patterns have proved definitely that the clay minerals are crystalline in structure and not amorphous as was once thought.

Photomicrographs taken with the electron microscope have shown that the clay minerals are roughly hexagonal plates (Johnson & Norton, Fundamental Study of Clay *J. Am. Ceram. Soc.*, 24, pp. 189-203). Broken primary valence bonds on the edges of these plates result in active areas of absorption.

II. Base Exchange Reactions of Clay and Its Relation to Dispersability of Clay

Because of its molecular structure the clay particle assumes a net negative charge in a water medium, and reacting as a negative ion, it adsorbs positive ions from the surrounding solution to balance its charge. The whole clay particle, then,

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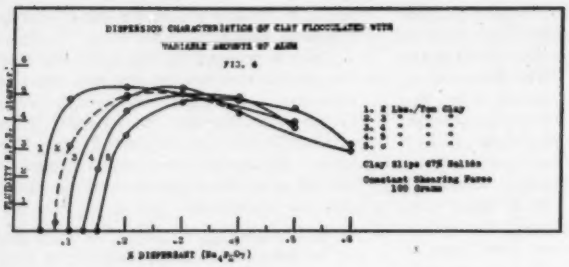
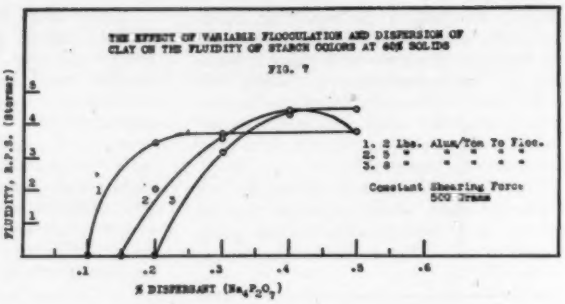



THE EFFECT OF VARIABLE FLOCCULATION AND DISPERSION OF
CLAY ON THE FLUIDITY OF STARCH COLORS AT 60% SOLIDS
FIG. 7
FLUIDITY, R.P.S. (Stormer)
% DISPERSANT ($Na_4P_2O_7$)
1. 2 Lbs. Alum/Ton Tx Floc.
2. 3 " " " " "
3. 4 " " " " "
Constant Shearing Force
500 Grams

surrounded by its electrical double layer may be compared to a dissociated electrolytic (Hauser, Colloidal Chemistry in Ceramics, *J. Am. Ceram. Soc.*, 24, pp 186-188). Just as a sodium soap will exchange its sodium for calcium in hard water, so may the positive charges of clay be exchanged for one another. This phenomenon exhibited by clays is called "base exchange."

The base exchange reactions of clay may be exprssed in the form of chemical equations. As, for example:

(1) Clay OH—H + NaOH → Clay OH—Na + H_2O

(2) 2 Clay OH—H + Na_2SiO_3 → 2Clay OH—Na + H_2SiO_3

(3) Clay OH—H + NaCl → Clay OH—Na + HCl

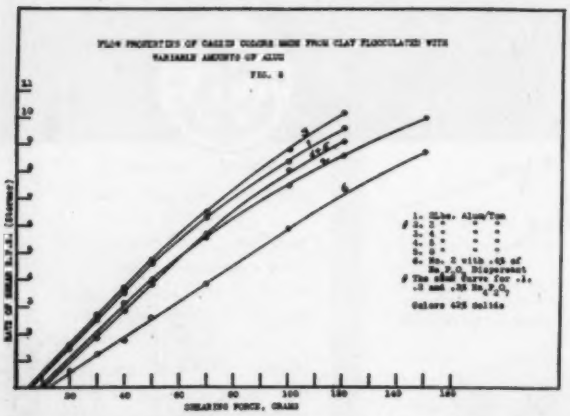
In all three equations sodium clay has been formed. In equation (1), by means of a strong base, in (2), with a basic salt and (3), a neutral salt. The addition of a slight amount of electrolyte beyond that required to complete the base exchange would result in the clay being dispersed in the case of equations (1) and (2). In equation (3) dispersion would not result. We see further from equation (3) that HCl, a strong acid, is a result of the reaction of NaCl with hydrogen clay, thus, free hydrogen ions are present in the solution. On the other hand, in equations (1) and (2), a slight excess of reagent above the base exchange requirement results in free hydroxl ions in the solution. The acid medium is the only factor that can explain why the alkaline salts disperse clay while the neutral or acid salts do not. This is in line with the observations of Hauser and Hirshon (Behavior of Colloidal Suspensions with Electrolytes, *J. Phys. Chem.*, 43, pp. 1015-36) that for maximum dispersion of a colloid the same ions must be present in the medium which are preferentially adsorbed by the colloid.

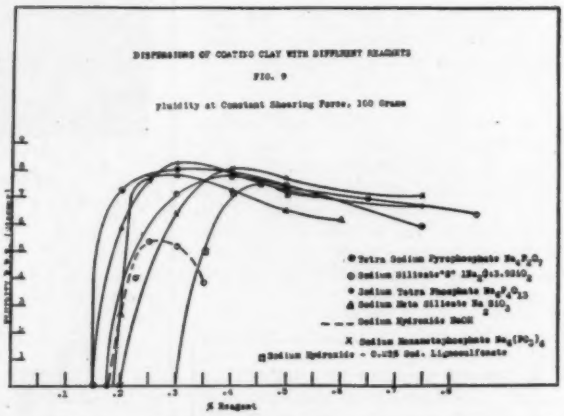
It should not be overlooked that other negative ions in solution could be adsorbed by the clay if present in sufficient concentration so that the law of mass effect would apply.

If progressively increasing amounts of alkali are added to a flocculated clay slip, it becomes more fluid, reaches a maximum, and then drops off and finally complete reflocculation may result.

Barium hydroxide exhibits very feeble dispersion properties.

Addition of even a small amount of a polyvalent positive counter ion will result in replacement of the monovalent counter charge and will prevent complete dispersion.




DISPERSING OF COATING CLAY WITH DIFFERENT REAGENTS
FIG. 9
Fluidity at Constant Shearing Force, 100 Grams
FLUIDITY, R.P.S. (Stormer)
% Reagent
Tetra Sodium Pyrophosphate $Na_4P_2O_7$
Sodium Hydroxide NaOH
Sodium Hexametaphosphate $Na_6(PO_3)_6$
Sodium Hydroxide + 0.42% Sod. Lignosulfonate

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III. Practical Applications of the Mechanism of Dispersion to Coating Clays

The knowledge gained from working with chemically cleaned clays has provided the fundamental basis for processing and using clays to the best advantage.

Certain generalizations can now be drawn concerning the optimum condition for dispersing clays to maximum fluidity.

1. Complete dispersion takes places only when hydroxyl ions are present in the water surrounding the clay particles.

2. Complete dispersion occurs only when the positive ion is monovalent such as sodium.

3. With chemically pure clay it makes no difference whether the hydroxl ion comes from a strong base or a basic salt. It will be shown experimentally that for commercial clays basic salts are generally more suitable than strong alkalies.

4. With a given clay slip the addition of a small amount of the proper alkaline salt results in a gradual increase in fluidity until a certain definite amount has been added when a very sudden and great increase in fluidity occurs. Further addition of electrolyte results in a decrease in fluidity.

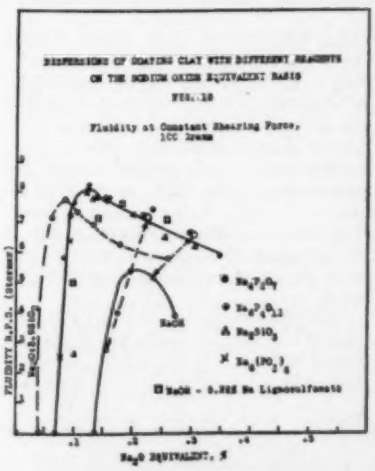
5. Any commercial coating clay is likely to contain small amounts of ions which interfere with complete dispersion. By the proper choice of dispersing reagents, these interferring ions can be made ineffective by precipitation and a degree of dispersion obtained approaching that of electrodialyzed clays.

Clay as received at the coating mills is essentially a hydrogen clay with small amounts of contaminating salts which originate from the crude clay and the method of processing. After chemical treatment the clays are washed by settling and filtering, so that contaminating salts are kept to the lowest possible minimum.

The effect of processing method on the dispersion characteristics can best be illustrated by example.

TABLE 1—Na_2O Equivalents of Clay Dispersing Reagents

Name	*Formula*	*Molecular Weight*	*Per cent Na_2O*
Caustic soda	NaOH	40.0	77.6
Sodium Meta silicate	Na_2SiO_3	122.0	50.9
Sodium Silicate "S" 1	$Na_2O : 3.9SiO_2$	296.0	21.0
Sodium hexametaphosphate ..	$Na_4(PO_3)_6$	612.1	30.4
Sodium tetra phosphate	$Na_6P_4O_{13}$	424.0	39.5
Tetra sodium pyrophosphate	$Na_4P_2O_7$	266.0	46.6
Sodium Lignosulphonate	———	———	8.9 (approx.)



A crude clay which had a *p*H value of 5.50 was dispersed with 7 lb. of "N" brand sodium silicate per ton in a slip of 29 per cent solids. This clay was fractionated by gravity to maximum particle size of approximately 15 microns. The fractionated sodium clay (*p*H 6.20) was divided into five equal portions and two, three, four, five and eight lb. of alum were added per ton of clay. Two lb. of alum per ton was just sufficient to produce complete reflocculation. The slip solids were adjusted to 20 per cent and flow properties determined by means of the Stormer viscometer. The results are shown in Figure 5. Note that only the

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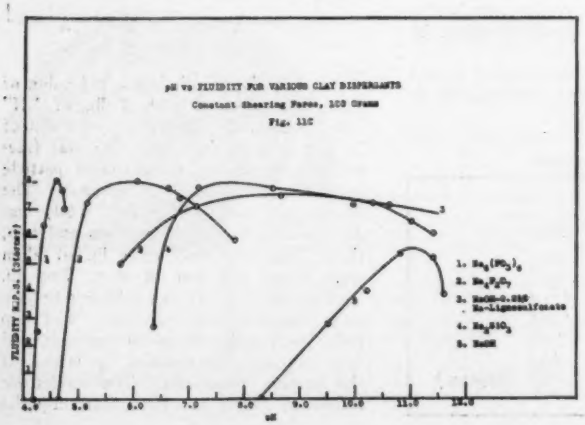
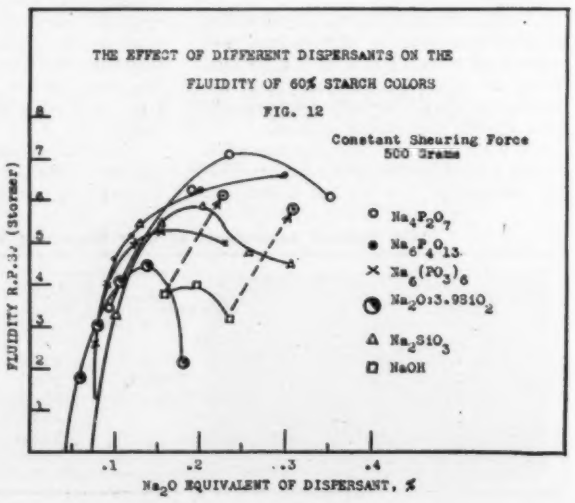
curve for 2 lb. of alum passed through the origin on the flow chart. It is, therefore, a Newtonian fluid at the lower rates of shear since it has no yield value and the rate of shear is a straight line function of the shearing force. All the other samples show nearly parallel curves, but progressively higher yield points which appear to be approaching a constant value. The effect then of converting from sodium to hydrogen-aluminum clay was to produce slips of an increasing degree of plasticity.

The flocculated slips were filter pressed to produce press cakes of approximately 68 per cent clay solids and dried. Since the same proportion of water was removed from the clay samples the contaminating salts remaining would be in proportion to that originally added for flocculation.

Each sample was deflocculated with variable amounts of tetra sodium pyrophosphate and flow properties determined. We have used the simplified method of plotting the flow rate at constant shearing force (100 grams). This method is valid because the separate flow curves for any one set of data do not intersect each other. The flow data for these samples is shown in Figure 6. Note first of all that the curves are the same general shape, and that after the addition of a certain minimum amount of reagent a sudden and very great increase in fluidity results, then as more reagent is added there is a drop in fluidity.

Note further that nearly the same peak value was reached at maximum dispersion. Only sample 5, where 8 lb. of alum per ton had been used for flocculation showed a slightly lower trend in the peak value. The only essential difference





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in these clay samples was the amount of flocculating reagent and the only difference in dispersion characteristics was the amount of reagent required to reach peak fluidity.

The clay slips represented by curves 1, 4, and 5 were made into starch colors at 60 per cent total solids and 15 lb. of oxidized starch per 100 lb. of clay. The flow properties were determined and plotted in the same manner as for the clay slips except that because of the much lower fluidity a higher constant shearing force (500 grams) was required. The results are shown in Figure 7. There is the same general trend as for the clay slips. The maximum color fluidity, however, did not occur in the most easily dispersed clay slips. Nor did the maximum color fluidity coincide with the maximum slip fluidity. In all cases a slightly greater amount of dispersing reagent was required to give maximum color fluidity than was required for maximum slip fluidity. This phenomenon has been noted previously by Rowland (The Colloidal Nature of Clay with Reference to Papermaking, *Paper Trade Journal* 111, No. 16, pp. 41-46). He explained it on the basis of a redistribution of water between the starch-clay components of the system.

Perhaps a further explanation may be a reaction between oxidized starch and the alkaline dispersing reagent. This could conceivably take place since oxidized starch does contain some free acid groups (Frieden & Press, *Starch for Paper Coating*, p. 14.). Such a reaction would result in a change in degree of dispersions of the clay component.

The same clay samples were made into casein colors of 42 per cent total solids and 13 lb. of casein per 100 lb. of clay. The casein was "cut" with 10 per cent of soda ash at 16 per cent casein solids. Each color was made up using alkaline casein only, as the dispersing reagent. In the case of sample No. 2, colors were made with .1, .2, .3 and .4 per cent of tetra sodium pyrophosphate. The flow curves for these colors are shown in Figure 8. Here, as in the case of dispersion with pyrophosphate-starch, maximum color fluidity did not occur with the clay sample which was at minimum flocculation. All samples showed low yield points and, therefore, a slight degree of plasticity. The spread in fluidity of all samples was not very great. In sample 2, dispersed with .1, .2, and .3 per cent pyrophosphate the flow properties were identical to the sample having no dispersing agent other than alkaline casein. With .4 per cent of reagent, however, a very sharp drop in fluidity occurred. We see from these considerations that alkaline casein itself is as good a dispersing reagent as pyrophosphate under the conditions of these tests.

One question in which the practical mill operator is vitally interested is what dispersing reagent is best. This question can best be answered by examples.

A representative sample of coating clay of the grade widely used in high solids starch colors was prepared into slips of 67 per cent clay solids with a number of different dispersing agents. These reagents were classified as follows:

1. Strong Bases
   a. sodium hydroxide (monovalent)
   b. barium hydroxide (divalent)
2. Salts of a Strong Base and Weak Acid
   a. sodium meta silicate
   b. sodium silicate "S" brand (1 Na_2O : 3.9 SiO_2
3. Complex Poly-phosphates
   a. sodium hexametaphosphate
   b. sodium tetra phosphate
   c. tetra sodium pyrophosphate
4. Organic Reagents
   a. sodium lignosulphonate (specially purified)

The sodium lignosulphonate used was a specially purified product and should not be confused with crude lignosulphonate.

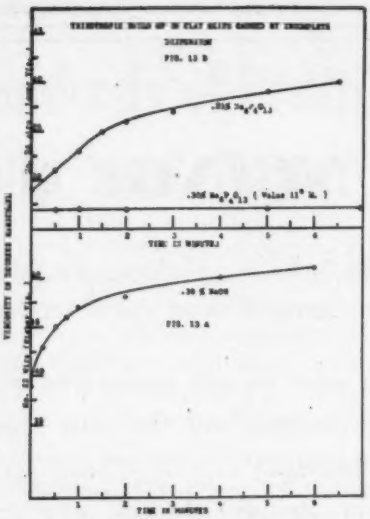
The dispersion curves are shown in Figure 9. With the polyphosphate reagents, the two sodium silicates, and NaOH-Na-Lignosulphonate, the peak fluidity was the same within plus or minus 0.3. The essential difference is in the amount of reagent required to reach peak value. With sodium hydroxide the peak value is much lower than the other reagents. The curve for barium hydroxide is not shown because it does not disperse clay appreciably except in very dilute supensions of no practical value to the paper coater.

If the sodium oxide equivalent of these

dispersing reagents is plotted against fluidity, the dispersion curves shown in Figure 10 are the result.

The dispersion curves on the Na_2O basis emphasize just how critical maximum dispersion is. At .07 per cent (1.4 lb. per ton) Na_2O for the polyphosphates the clay slip was a stiff plastic paste too viscous to obtain a reading on the Stormer instrument. An increase of .01 per cent in Na_2O results in a fluidity value of 4, or approximately one-half of the maximum value. .12 per cent (2.4 per ton of clay) produces maximum fluidity. Additional Na_2O beyond peak fluidity results in a decrease.

In Figure 11, A and B, is shown the variation in *p*H values of the clay slips as increasing amounts of dispersing reagent is added. The *p*H of the clay used in these tests was 4.2 in distilled water. As the first small amounts of reagents are added no appreciable change in *p*H occurs. In this range sodium ions are replacing the hydrogen counter charges of the flocculated clay particles, as we have already seen. As soon as the exchange reaction is complete, free hydroxyl ions are present in solution. This results in a sudden rise in *p*H value and in the preferential adsorption of hydroxyl ions by the clay particles which builds up the total charge and the clay becomes dispersed, finally reaching a maximum value. In Figure 11 B, Area 1, represents the base exchange reaction for the polyphosphate reagents, and Area 2, represents the build up of the repulsive forces to a



maximum value. Beyond Area 2, the sodium salt concentration begins to reduce the total charge.

These *p*H values bring out another fact of importance to the practical coating operator. Clay can be dispersed to maximum fluidity over a wide range of *p*H values above that of the clay itself, by the proper selection of reagent or combination of reagents. *p*H value of the slip is dependent on the clay and the dispersant used. The amount of Na_2O is actually the determining factor in degree of dispersion.

To the sodium hydroxide slip represented in Figure 10 by .155 per cent Na_2O the equivalent of .07 per cent Na_2O was added as pyrophosphate to give a total of .225 per cent Na_2O. To the slip corresponding to .232 per cent sodium hydroxide, .07 per cent Na_2O was added as hexametaphosphate to give a total of .302 per cent Na_2O. As shown by the arrows in Figure 10, the new fluidity values fell on the dispersion curve for the poly-phosphate reagents. Reactions with both reagents were accompanied by a drop of *p*H. In the case of pyrophosphate from 9.5 to 8.90 and with hexametaphosphate from 11.4 to 9.0. This again emphasizes the secondary importance of *p*H in clay dispersion, and demonstrates one method of obtaining controlled *p*H in the dispersion where it is desirable.

It is indicated that the role of silicate and lignosulphonate (Brookbank, Industrial Uses of Alkali Lignin, *Tech Assoc. Papers*, TAPPI, 1946, pp. 184-186) ions in clay dispersion is also largely due to the removal of interfering ions. The poor showing of sodium hydroxide alone as a clay dispersant is due largely to the fact that it does not completely remove interferring ions.

We can see, now, why these reagents are so effective as clay dispersants. First, they provide the necessary sodium and hydroxyl ions; second, the anion of these salts are efficient reagents for the removal of heavy metal ions which will interfere with the complete dispersion of clay. Because they are buffered salts, the danger of adding large excess Na_2O is lessened.

Sodium lignosulphonate alone does not disperse hydrogen clay efficiently at high solids because of its low Na_2O content (8.9 per cent approx.). If this deficiency is made up by the addition of NaOH it becomes a very efficient reagent giving stable dispersions over a wide *p*H range as shown in Figure 11 C.

We have now to consider the interference of negative ions with dispersion. A batch of clay was treated with barium carbonate to remove all sulphate ion, and the clay was then dispersed with tetra sodium pyrophosphate. In this slip, a fluidity was obtained with .2 per cent reagent equal to .3 per cent of reagent before treatment, but we have already seen in Figure 9, the difference between these amounts of reagent was very small originally. The removal of sulphate also had scarcely any effect on the sodium hydroxide dispersion.

The slightly greater efficiency for "S" brand sodium silicate, we believe, may be accounted for on the basis of the very high silica ratio of this reagent (1 Na_2O : 3.9 SiO_2). Weiser (*Inorganic Colloid Chemistry*, Vol III, pp. 423-424) has observed the greater efficiency of high silica ratio silicates over many other alkalies and attributes it to the presence of colloidal silica which by strong adsorption of sodium ions upsets the equilibrium with hydroxyl ions. This would make hydroxyl ions more readily available for adsorption by the clay, and thus, result in a faster build up of the charge on the clay particle.

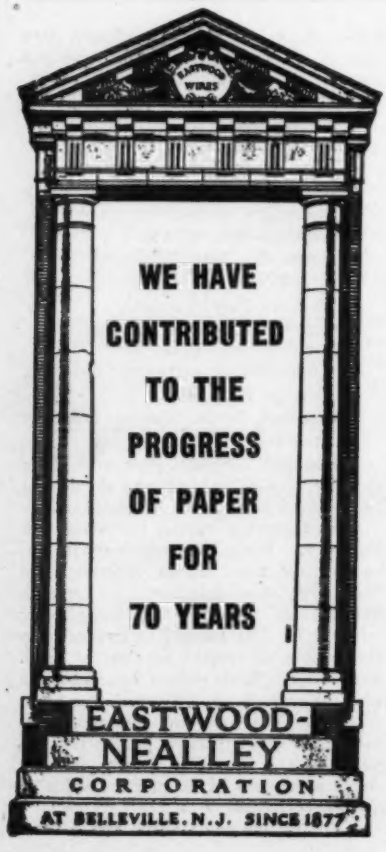
In Figure 12 is shown a plot of starch color fluidities (60 per cent solids—15 per cent starch) against the per cent Na_2O used to disperse the clay. These are the same dispersed slips shown in figure 10. The fluidity values for starch colors are somewhat less reliable than for the clay slips because we experienced some difficulty in reproducing the same fluidity in the starch from batch to batch and the time consumed in making up a series of colors resulted in gelatin of the starch in some cases. All measurements were made immediately after preparation of the starch clay mixture by means of a high speed agitator.

In spite of these limitations in accuracy, there are some generalizations which appear to be valid.

First, this data shows definitely that the peak fluidity value for oxidized starch colors requires a Na_2O content higher than that to produce maximum fluidity in the clay. This is further confirmation of our previous view that there is an exchange of alkali between the star-clay systems in a coating color.

This means that to obtain maximum fluidity with the starch color, the clay slip should have some excess alkali over the produce maximum slip fluidity.

In these experiments, tetra sodium pyrophosphate and sodium tetra phosphate gave the most fluid starch colors. The fact that the hexametaphosphate did not come up to these, we believe, was because of the low *p*H values in the mixed color, since .75 per cent of this reagent gave a *p*H value of only 5.00. *p*H is apparently of more importance to the fluidity of the starch component than it



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is to the clay component of the mixed color system. The caustic dispersed clays to which small amounts of tetra sodium pyrophosphate and sodium hexametaphosphate were added produced starch colors in the same fluidity range as the most fluid colors produced with a single reagent and same amount of Na_2O, but at considerably higher *p*H values. This suggests that highly buffered clay dispersants are most satisfactory for producing a fluid starch color which is stable over a reasonably wide Na_2O range. This matter deserves further investigation.

The poor showing of silicate "S" which was a very efficient dispersant for clay alone, we believe, may be due to some unfavorable reaction between colloidal silica and the starch.

IV. The Relationship of Dispersion to Thixotropy and Dilatancy of Clay Slips

The phenomenon is often noted in clay slips, especially at high solids concentration, that on standing undisturbed for some time they form more or less firm jellies. If stirred the slip again becomes fluid, if allowed to stand, it again reverts to a jelly. This reversible "sol-gel" condition is termed "thixotropy," and is characteristic of a great many substances in suspension, especially when the particles of the substance are not symmetrical in shape, as for example, the thin hexagonal plates of clay.

If a thixotropic system is placed in a rotational type viscometer such as the Stormer or McMichael and a shearing forced applied, we may find that considerable force will be required before flow starts; this initial force is called yield point. After flow has been started it may increase faster than a direct ratio to the shearing force.

Another way of demonstrating thixotropy is to first subject the system to a higher shear then measure the rate of build up in viscosity at a lower rate of shear. This method was used with one of the caustic soda dispersed slips which we have seen was not completely dispersed with any amount of reagent because of heavy metal ion interference. This is shown graphically in Figure 13, (a).

The slip was placed in a McMichael viscometer and first subjected to a shear of 40 rpm then quickly reduced to 18 rpm and timing started. We see that the viscosity builds up with time, rapidly at first, then slowly approaches a constant value for the rate of shear. In Figure 13, (b), the same type of curve is shown for the dispersion with sodium tetra phosphate at .25 per cent reagent. A similar test was made with .3 per cent of reagent which amount gave maximum fluidity. It had a viscosity value of 11 degrees (No. 26 wire) and showed no change in viscosity after 10 minutes. Because it had such a low value this sample could not be shown to scale on the chart. This sample was not thixotropic.

From the Stromer fluidity curves it was found that for the clay used in these tests the sample which showed maximum fluidity with every reagent passed through the origin on the chart, except for the caustic soda dispersion, which as we have seen, did not produce the maximum fluidity possible for this clay but its peak fluidity was least thixotropic of that series. All samples not a maximum fluidity showed definite yield values and thixotropic characteristics.

We can make this generalization: if a clay is at maximum degree of dispersion, it exhibits minimum thixotropic properties.

Another phenomenon sometimes, though not often, encountered in clay slips is dilatancy. This is the property exhibited in some suspensions in which resistance to flow increases at a greater rate than increase in rate of flow. (Fischer, Green and Weltmann, *Rheology of Surface Coatings*, p. 64). Quicksand is the classical illustration of this phenomenon. If struck sharply the sand is rigid and solid; but slow sustained pressure causes objects to sink into it.

Dilatancy is a result of close packing of the particles, so that when they are disturbed the solid volume becomes greater than the liquid volume of the system, that is, all or most of the water is sucked into the voids between the particles leaving no lubricating liquid film between.

Dilatancy is most characteristic of clays having a high percentage of coarse particles say above 10 or 12 microns in size. Such a clay may exhibit very fluid slips up to a certain solids content when it

suddenly becomes very dilatant. At this critical point the addition of only a fraction of a per cent of water may be sufficient to overcome the dilatancy.

That dilatancy may also be a function of the degree of dispersion is shown in Figure 15. This shows the Stormer flow curves for a sample of commercial clay which was purposely contaminated with a small amount of an interfering ion. Curve (a), had .1 per cent tetra sodium pyrophosphate added as a dispersant. Note the extreme degree of dilatancy. Curve (b) is the same clay with .2 per cent of reagent and there is no indication of dilatancy.

In the case of sample (a), the agglomerates present as a result of incomplete dispersion must have been bound together with forces which caused them to act as if they were discrete particles. The result was equivalent to a coarse particle clay.

Study of Dryer Operation to Determine Cause of Failures

H. M. SPRING
Asst. Chief Inspector
Mutual Boiler Insurance Company
of Boston

Accidents to dryer rolls come under one of the two general classifications. First, there are major explosions that may result in injuries or loss of life and great damage to property. The second type of failure is the cracking of some part such as a cast iron head, usually with no further damage.

Major explosions fortunately are not common occurrences, but the potential hazard is far too great to overlook.

Cracking of a dryer head sounds insignificant in itself, but the development occurs far too frequently. It invariably means a forced shutdown and costly loss of production.

While some steel jacketed dryer rolls have been built—most of them quite recently—by far the larger number in service of cast iron because of the greater surface hardness and ease of casting iron into desired shapes.

A cylindrical shell presents no especial problem in design since stresses and safe pressures can be calculated readily. The heads and their influence, however, cannot be so checked by mathematical formulae. The so-called experience of a few manufacturers dates back to rule-of-thumb selection of a pattern and casting that appeared substantial. If failures were not frequent, the manufacturer appeared to consider "experience had proven the design to be satisfactory."

The few states that have expanded their boiler laws to cover cast iron dryer rolls require a hydrostatic test to destruction of a full sized dryer. Then by dividing the bursting pressure by an appropriate safety factor, a maximum allowable pressure is approved for other dryers of like material, size and design. There are but few designs that have been so proven; furthermore, a test to destruction may mean little regarding the stresses set up by operating conditions.

In most dryer rolls, each head and trunnion are an integral casting bolted to the shell. The heads are frequently reinforced with cast-in-ribs on the inside, adding to the complexity of stresses and difficulties in their calculations.

It has been our experience that failures occur more frequently at the drive end of the roll. Possibly this is explained by thinking of maximum torque or turning force from the driving gear. It seems also to tie in with certain operating faults, one of which leads to vibration by worn gear teeth. Temperature stresses during warm up periods may be much greater at the drive end where steam is admitted.

Failures that are more often at the wet end of the machine appear influenced by the greater temperature differential resulting from comparatively cold, wet paper coming in contact with the hot dryer shell.

Figure 2 shows the center of a dryer head from which the trunnion has broken off. The broken trunnion is shown in Figure 3. One very important feature of dryer head design is the effect of a sharp corner rather than a long radius fillet or curve to gradually change the shape. The sharp corner acts as a notch to set up a high concentration of stresses, and it invites cracking or breaking. The failure in Figure 3 started at just such a sharp corner.

To demonstrate further the cause of cracking in dryer heads, the cracked head in Figure 5 was drilled with a series of holes across its diameter and the head was broken over a short length of steel beam. The crack may be seen with its origin at a sharp corner near the handhole. Revealed also by the fracture is a great amount of slag in the casting. Figure 6 shows a close view of the crack and of the slag inclusions, while in Figure 7, which shows the broken trunnion, still more slag is readily apparent. This slag

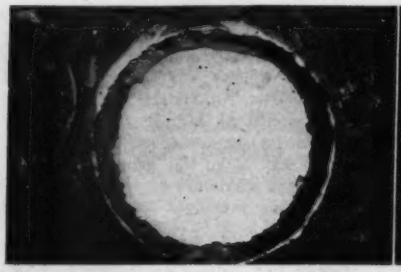

Figure 2

Figure 3

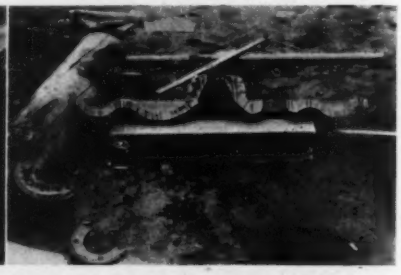

Figure 5

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comes from faulty foundry practice, and it is a source of weakness.

In all cases, cracking is invited by sharp corners either between the trunnion and the head or at a manhole or handhole. In Figure 8 another crack at a handhole is shown. Attempts were made to stop progress of the crack by drilling and tapping for a bolt at one end and by brazing the defect. The repair was not successful and a new head was necessary.

In an effort to locate and measure the stresses that cannot be calculated, we embarked on a program of special testing, using equipment developed during recent years. The first part of each series of tests involved the use of Stresscoat. This is a brittle lacquer supplied in various sensitivities, and the one best suited for prevailing temperatures and humidity is selected. Figure 9 shows Stresscoat being sprayed on the head of a dryer roll set up for the tests, while Figure 10 shows the piping for admitting pressure of water, compressed air or steam.

The light area of the head in Figure 10 has been covered with the Stresscoat. The purpose of this coating is to show by a crack pattern developed in the Stresscoat by the tests, the location and direction of maximum stresses. The cracks occur, of course, at right angles to the direction of maximum pull. Because of the brittle character of Stresscoat, the cracks in the coating are caused by stresses low enough lo avoid any damage to the dryer roll. In order to stimulate the wost possible operating condition, the dryer roll was half-filled with water. Pressure was then built up in increments by admitting compressed air. The crack pattern at the bolt circle of the head is shown in Figure 11.

The next step in the tests was to attach SR-4 strain gauges to permit measurement of any deformation under test pressure. The SR-4 strain gauge consists of a grid of wire accurately drawn to one-thousandths of an inch in diameter. When attached to the surface of a structure by an insulating cement, a controlled current of electricity is passed through the gauge. In the indicating instrument a gauge of like resistance is electrically balanced against the test gauge. As the structure deforms ever so slightly under test pressure, the wire grid elongates and decreases in diameter as it stretches out. With the reduction in diameter, there is an increase in resistance with resulting unbalance at the indicator. The amount of unbalance caused by the test pressure may be read in millionths of an inch.

Figure 12 shows a clamp improvised to hold an SR-4 strain gauge on the fillet between the trunnion and the head while the cement was drying; Figure 13, the leads from a rosette of three strain gauges attached to the trunnion fillet through a chipped out section of a shrunk sleeve.

Figure 6

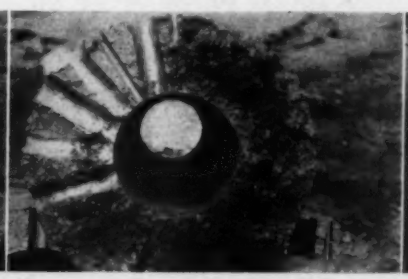


Figure 7

Figure 8

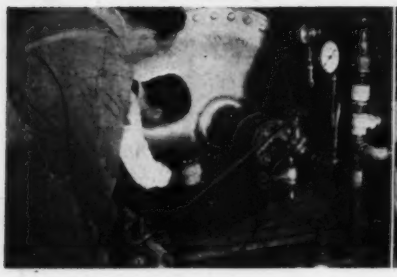


Figure 9

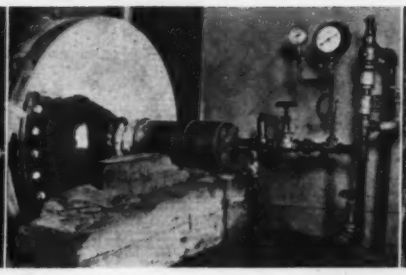


Figure 10

Figure 11

The dryer roll under static test is shown in Figure 14 with the strain gauges wired to the indicator. The sling is provided so that the actual stresses due to bending may be measured. This is accomplished first by removing the weight on the trunnions and then permitting full weight to rest on the trunnions. A close-up view of the instruments is shown in Figure 15.

On completing the static or stationary tests, we wished to learn just what additional stresses occurred when the dryer roll was in actual operation. The slip rings and brushes shown by Figure 16 were designed to permit connections between the strain gauges and indicator while the dryer was in operation. Figure 17 shows the strain gauges wired to the phosphor bronze brushes bolted to the head, while Figure 18 shows the back of the stationary slip ring assembly bolted to the machine frame

Figure 19 is a picture made while the dryer roll was in operation at a speed of 700 fpm. The picture was taken from beneath the dryer and shows the brushes tracking on the slip rings. It shows also a broken wire that concluded the test.

These static and dynamic tests revealed stresses far higher than many would believe. Thermal stresses due to temperature differentials were of damaging magnitude. As the test program develops to a conclusion, it is possible that the results may have some influence on certain designs.

Turning to problems that are the responsibility of the operating personnel, there is, first, the control of pressure. This is exceedingly important since an explosion may result from excessive pressure. All superintendents and their operators should know what maximum pressure is allowed on the dryer rolls, and they should make sure this pressure is not exceeded. The pressure reducing valves and safety valves of adequate capacity should be kept in good order.

If any repairs are made to a dryer roll, they should be made only by competent workmen under the supervision of one understanding just what is being done. In one recent serious chain explosion involving two 72-in. dryer rolls and a 144-in. Yankee dryer, it is understood from one report that a limited number of bolts holding one of the 72-in. diameter dryer heads to the shell were pulled up very tightly to overcome leakage. If all bolts were not pulled up in equal tension, the eccentric loading might well have resulted in such a failure. While full details of this accident are not immediately available, it was learned from a reliable source that the tensile strength of the dryer involved in the initial failure was less than 55 per cent of that which had been specified.

Repairs to cracks are too involved to describe in detail, but it may be said that they are seldom successful. Repairs should not be attempted without consulting your boiler insurance company.

The removal of condensate is of importance if excessive bending stresses due to the added weight are to be avoided. Also, excessive stressing of the dryer parts due to temperature changes will be avoided if the condensate is properly removed from the dryer rolls. There are numerous

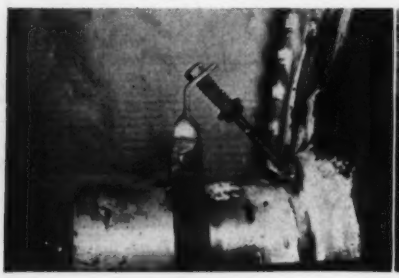


Figure 12

Figure 13

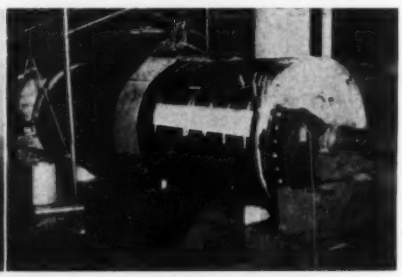
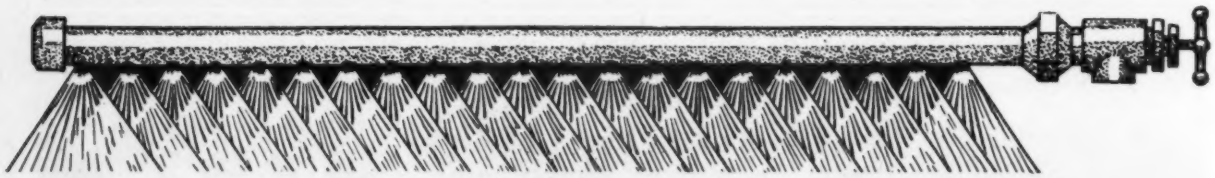


Figure 14



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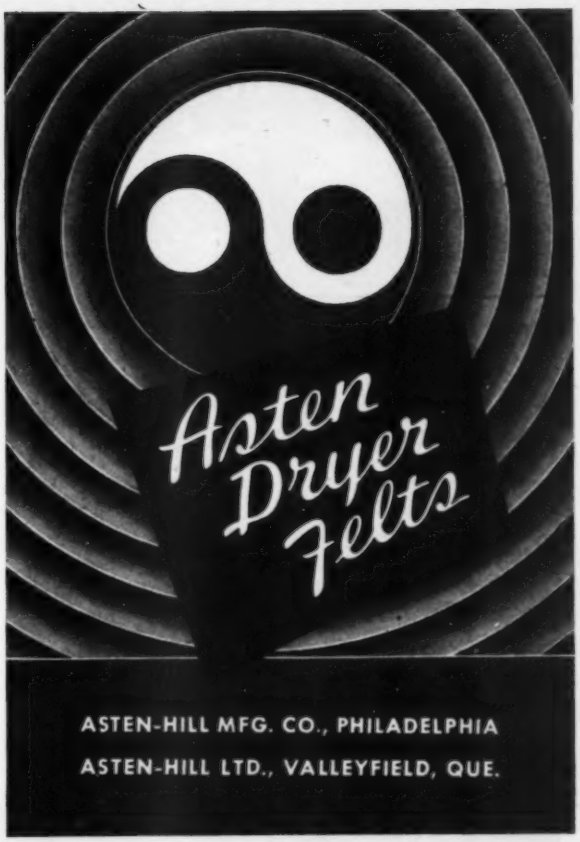

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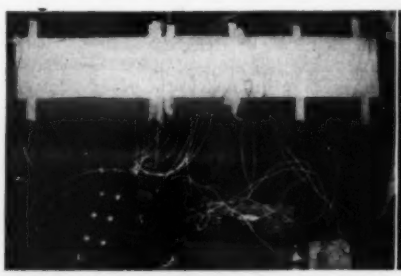


Figure 15

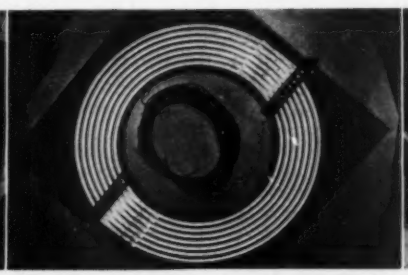


Figure 16

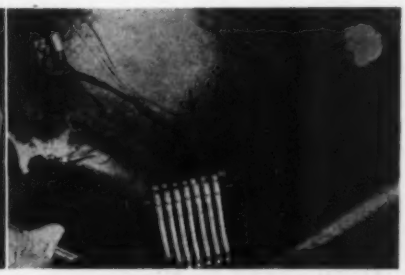


Figure 17

methods of checking this, including thermometers or test cocks on the condensate piping. Whatever method is used, the effectiveness should be checked frequently.

Care should be taken to allow adequate time in warming up the paper machine. The sudden admission of steam under pressure may cause dangerously high stresses resulting in cracking or even an explosion. From test data thus far obtained, it appears advisable to rotate the dryers slowly while warming up.

Lubrication of the bearings at each trunnion is of vital importance if undue wear is to be avoided. Not only will inadequate lubrication cause friction resulting in added torsion, but the resulting wear may also permit the roll to change in position until the gear teeth mesh on the bottom. The resulting vibration will certainly invite breaking of a pressure part.

Some machines are driven in such a manner that it is possible to develop considerable shock when starting. In fact, with a motor drive, the sudden starting shock has been known to shear off the heads of the four bolts holding the bearing cap on the dryer trunnion. Care should be taken in starting the machine so as to avoid this impact.

The maximum safe speed for a paper machine involves many factors. The recommendations of the manufacturer of the paper machine should be known and they should be followed. Excessive speed may result in rapid wear and possible breakage of some important pressure part.

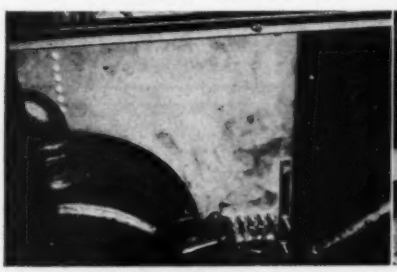


Figure 18

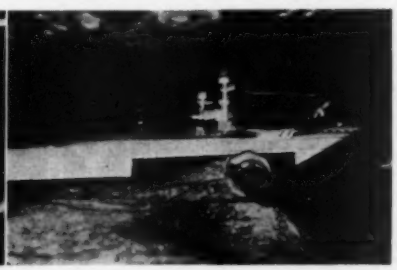
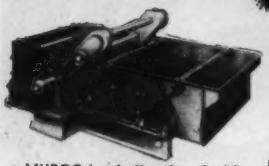


Figure 19

BEFORE YOU INSTALL EQUIPMENT IN YOUR MILL, LOOK INTO

MURCO Equipment



MURCO level vibrating double deck chip screen.

The items illustrated are only two of a complete line of papermill and woodroom equipment that includes axial flow agitators, stainless steel improved flat screens, roll heading machines, pulpwood slashers, chip crushers, wood cleaners, knot drills, knot saws, collapsible winder shafts, quick opening gate valves, screw conveyors and flights, and unit heaters.

Complete catalog information on any equipment that you may require for your papermill or woodroom will be sent you upon request.

Pulpwood chippers.

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Specialized Industrial Cleaning

Silicones—a New Family of Chemical Polymers

W. T. EVELETH
Resin and Insulation Materials Div.
Chemical Department
General Electric Company

About the turn of the century, in 1904, Professor Kipping in England laid the foundation with the chemical building blocks we know now as the silicones. His interests over the succeeding thirty years contributed greatly to our fundamental knowledge of the chemical structure of organic-silicon compounds.

The silicones chemically bridge the gap between organic compounds based on carbon-to-carbon bonds and inorganic compounds such as sand, quartz, and the silicates. The silicones chemically are composed of atoms of silicon surrounded by atoms of oxygen and carbon. The silicon-oxygen linkages furnish the great heat resistance and the similarity of sand. The carbon-silicon bonds with the organic groups; that is, the methyl, phenyl, or other organic radicals attached to the carbon, provide the flexibility and versatility of properties lacking in sand.

The silicones produced in the preway years were somewhat brittle and did not possess the desirable characteristics which are now possible. By the time this country was involved in World War II, research and development had advanced to such an extent that war applications brought on a more than normal demand for their use. Materials such as water-repellents, oils, greases, synthetic rubbers, plastics, and compounds were conceived and used to excellent purpose.

War Uses—Water-Repellents

In addition to extreme temperature stability, silicones possess several other outstanding properties. Extremely thin films, when applied to paper, cloth, ceramics, and glass, render the surface water-repellent to a degree not possessed by waxes or similar substances. This property was made useful in treating aircraft radio ceramic insulators to assure satisfactory performance under severe moisture conditions. The paper filters in Army and Navy gas masks were likewise treated to keep out water in case of accidental immersion during amphibious operations. The process involved was unique to the paper industry. Rolls of paper were passed through a chamber containing vapors of the chemical compound, followed by exposure to ammonia vapor. The contact time was approximately two seconds.

Peacetime uses will include water-repellent fabrics for rainwear, sizing of paper, protection of glassware, plastics, and leather goods. Of primary interest to the paper industry will be sizing chemicals for addition to beater stocks, which are effective in concentrations about 1/10 of that required with rosin. These coatings are heat-stable and not affected by contact with solvent.

Silicone Oils

Silicone oils are heat-stable liquids and possess high flash points, about 600 Fahr., as well as low pour points of —120 Fahr. to —130 Fahr. They will burn only with extreme difficulty when a continuous source of heat is applied. They show

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LINDSAY WIRES ARE 44 YEARS OLD

On July 17, 1903 died James A. McNeil Whistler, the world-famous painter of "Mother" and other immortal works, in London.

Inspiration counts for less in the realm of art than does prodigious craftsmanship. The nature of the Fourdrinier seam is one of many subjects to which, over a period of 44 years, Lindsay technicians have given exhaustive study. Only by mastering and improving every seemingly small "detail" can sound progress be attained in the manufacture of wire cloth or any other product.

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Lindsay WIRES
FOR PAPER MILLS

much less change in viscosity or consistency than any other known liquids over a range of 500 Fahr. to —100 Fahr. They are unaffected by metals and do not sludge at temperatures up to 300 Fahr. in the presence of air. Their lubricating properties are not comparable with petroleum, but with proper design of equipment they have given excellent performance in aircraft hydraulic systems. We may expect to be able to use smaller hydraulic lines and save as much as 35% in weight because of their unique viscosity characteristics. We can expect in the future to see other extensive uses in aircraft such as damping fluids and as dielectric liquids for capacitors and transformers. Silicone fluids are already finding many applications as mold release agents in the plastics and tire industries.

Compounds and greases have been formulated from these oils which are used in plug cocks and spark plugs, and we have promise of ball-bearing lubricants for rotary equipment at high temperature and speeds.

Silicone Rubber

Another class of silicones are rubber-like in nature and have found use over an operating range of —50 Fahr. to 520 Fahr. as resilient gaskets. The tensile strength and tear resistance are somewhat lower than that of synthetic rubbers. This limits their use where such properties are essential. I would like to point out that for continued exposure above 250 Fahr., the tensile strength of synthetic rubber will decrease rapidly to a point below that of silicone rubber. Silicone rubber may be reinforced with Fibreglas or asbestos cloth; this construction will contribute greatly to improving the mechanical properties.

Wartime introduction of silicone rubber was made by the General Electric Company in its fabricated turbosuperchargers and Navy 12- and 24-inch signaling searchlights. With experience thus gained and subsequent developments, applications will include a widespread use for shaft seals, oven gaskets, refrigerator gaskets, and vacuum gaskets. The designer may at least have a resilient material for use at temperatures at least 100 Fahr. above that of synthetic rubbers now available.

Silicone Resins

As a prediction of things to come with silicone resins, I would like to close by mention of new paint finishes which will far exceed the durability of conventional materials both in chemical and moisture resistance. Outdoor-weather resistance to discoloration and chalking, and heat resistance far greater than anything outside of porcelain enamel may be safely anticipated. High-temperature plastics and adhesives will likewise make their contributions to the world of tomorrow.

Some Operations Results from a Ten-Knife Chipper

R. C. RICHTER
National Container Corporation

National Container in Jacksonville placed its Carthage ten-knife chipper in operation on December 10, 1945.

Prior to installing the ten-knife chipper, we had a Carthage four-knife chipper, which had been in service for seven years and eight months. Both chippers were set to make three-quarter inch chips. Chips from the four-knife chipper were screened—the oversized chips were sent through a crusher and re-screened before going to the chip bin.

The ten-knife chipper gave the better chip.

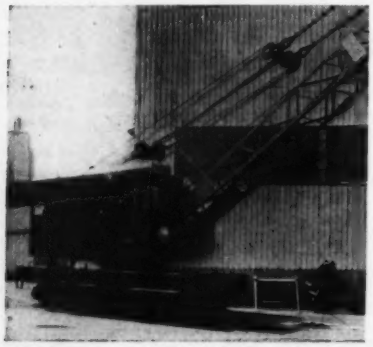
Chips from this chipper go directly to the belt carrying the chips to the chip bin, no crushing or screening being necessary. The chips reach the chip belt through the centrifugal force developed by a series of paddles on the outer edge of the chipper disc, thus eliminating an elevator.

The major effect of the uniform chips has been the effect on the digester yield. In April, 1941, the digester yield from our 3523 cubic foot digesters was 10.95 tons, or 6.22 pounds air dry pulp per cubic foot; in April, 1947, the yield was 12.84 tons, or 7.29 pounds air-dry pulp per cubic foot. The percentage increase is 17.26. This increase in digester yield was effected with less active alkali per ton of pulp. In April, 1941, the active alkali consumed per ton of pulp was 540 pounds; while in April, 1947 it was 500 pounds. This was a decrease of 7.5 per cent. We feel that this increase in yield has been due very largely to the ten-knife chipper.

NEW EQUIPMENT AND SUPPLIES

Diesel-Electric Locomotive Crane

American Hoist and Derrick Co., St. Paul, Minn., has announced a diesel-electric locomotive crane with a capacity of 40 tons. The design of the crane is based on a series of recent patents under which electric power is used to travel the crane along the rails while diesel power is used to operate the turntable and load lifting mechanism. The electrified drive is claimed to cut maintenance work as



much as 50 per cent and to make all service work much simpler.

In addition to hook work, the crane, designated as the American *Dieselectric*, is used with grab bucket, grapple, magnet, and for car switching. Another patented feature is use of electric power from the traction generator for energizing the magnet, with over-excitation for maximum loading.

Coated Paper Binders

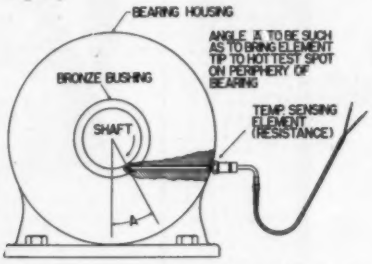
National Starch Products, Inc., 270 Madison Ave., New York 16, N. Y., has announced *Natex 344* as a detrin binder for machine coated papers as well as for use on brush roll or air-brush coaters, when similar high solids coatings are desired. The distinctive properties of this product, according to the announcement, are high clay carrying strength and high water retention, as well as good viscosity characteristics and dispersing power for pigments.

A chlorinated starch, Flokote, also is announced by the same firm for use primarily on coaters other than machine types as well as for calendar sizing. This product, according to the manufacturer, is used in the manufacture of such widely different grades of stock as coated book, coated board, and wall paper.

Bearing Temperature Monitoring System

Thomas A. Edison, Inc., West Orange, N. J., has announced an automatic, multi-point bearing monitoring system for industrial operations. As many as twenty-four bearings can be monitored from each central control cabinet.

An electrical resistance bulb, only .215-in. in diameter, is mounted in a small hole drilled in each bearing to be monitored. Only the bulb tip is temperature sensitive; and, because the tip is located in direct contact with the bearing metal very close to the actual inner bearing surfaces, the existing bearing temperature is sensed rapidly.


BEARING HOUSING
ANGLE A TO BE SUCH AS TO BRING ELEMENT TIP TO HOT TEST SPOT ON PERIPHERY OF BEARING
BRONZE BUSHING
SHAFT
TEMP SENSING ELEMENT (RESISTANCE)
A

The temperature of each bearing in the system is checked automatically every two minutes. If, when checked, the temperature of any bearing exceeds an established maximum (which may be different for each bearing), an alarm is sounded to call an attendant. The overheated bearing is identified by an indicating lamp on the central control cabinet panel.

An attendant reads the actual temperature of any bearing by plugging into the appropriate jack an electrical thermometer which is built into the central control cabinet panel. Thus, it is possible to observe whether the temperature of a bearing is rising rapidly or slowly.

A modification of the system not only sounds an alarm at one established temperature, but also automatically shuts down the machine if a second, and higher, established temperature is reached.

In either system, checks of the actual temperature of each bearing may be made any time at the control panel, on which facilities are also provided for the checking and testing of all circuits and alarms.

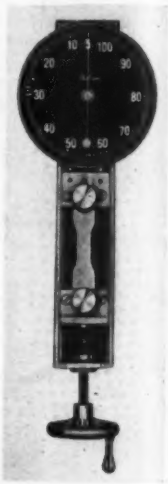
Foot Mat for Minimizing Fatigue

Avenue Manufacturing and Sales Co., 1835 Milwaukee Ave., Chicago, Ill., has introduced a non-marking, black rubber mat, designated as the *Magic Mat*, for use by persons who stand on their feet

for long periods of time. The mat is 21¼ in. square. Its top and bottom surfaces together are made up of more than 2,000 ¼ in. high rubber cones for cushioning the feet. The overall thickness of the mat is 11/16 in.—with a center layer thickness of 3/16 in.

Tensile and Compression Tester

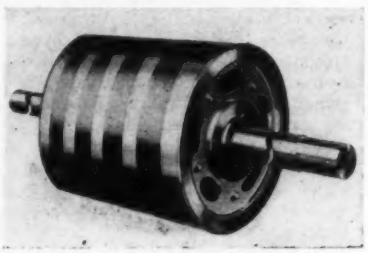
W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill., has announced a physical testing instrument, the *Dillon 100 lb. Universal Tester*, that handles specimens in tensile and in compression. This tester is so compact that it can be hand-held for operation. It will handle tensile specimens 1¾-in. wide by ⅛-in. thick. In compression, it will handle fiberboard and other similar products.



Weighing 3¼ lb., and having a 3-in. stroke, a length of 15 in. (including handwheel), and a 5 in. O. D. dial, and finished in polished aluminum and gray crackle, the instrument has a capacity of 100 lb. by 1-lb. increments with an accuracy of 2 per cent of indicated load.

Permanent Magnetic Pulley

The Homer Manufacturing Co., Inc., Lima, Ohio, has announced the *Homer Permanent Magnetic Pulley* as an addition to its line of permanent magnetic tramp metal separators. Designed for use as a heady pulley in belt conveyor systems,



to remove ferrous metal particles and pieces from materials being conveyed, the pulley, built of cast aluminum and steel, is available in all standard diameters above 10 inches, and in widths that are multiples of 6 inches.

Temperature Testing Instrument for Roll Surfaces

Pyrometer Service Co., 230 River Road, North Arlington, N. J., has announced an instrument, *Roll Temp*, for obtaining the temperatures of roll surfaces. Essentially a combined surface pyrometer and thermocouple, the instrument proper is mounted permanently on the machine upon which it is to be used. A temperature measurement is made by pressing the thermocouple lightly on the roll surface to be checked and reading the instrument dial for the temperature thus indicated.

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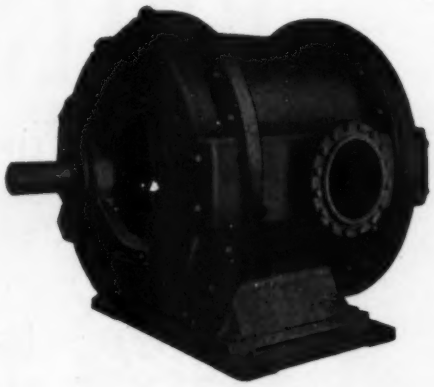

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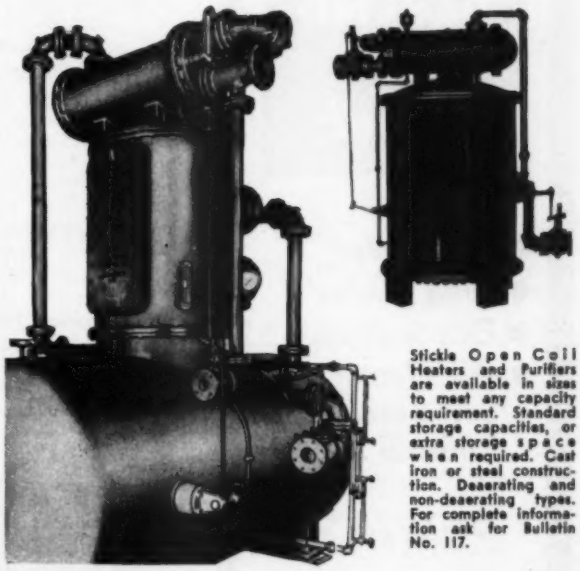
• Stickle Open Coil Heaters make contact of water and steam direct and complete for instantaneous transfer of heat units. Water is broken upon entering heater by passing through perforated surfaces, is kept in an agitated state by contact with bars as it passes in thin film over surfaces of Open Coils, and then falls from tray to tray in thin streams and drops.

• Stickle Heater Design permits faster heating; liberates lime and magnesia, which is deposited on surfaces of Open Coils, or trays, as scale; and eliminates oxygen and other non-condensable gases. It contributes to further purification of the boiler feed supply by adding to the heated and purified raw makeup water the condensation of the steam used in the heating process—this constituting fully one-sixth of the volume. Admission and overflow are automatically controlled.



Stickle Open Coil Heaters and Purifiers are available in sizes to meet any capacity requirement. Standard storage capacities, or extra storage space when required. Cast iron or steel construction. Deaerating and non-deaerating types. For complete information ask for Bulletin No. 117.

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Revolving Carriage for Lift Truck

A fork lift truck accessory, the *Revolving Carriage*, has been announced by Towmotor Corporation, 1226 East 152nd St., Cleveland 10, Ohio. Designed for handling solid, liquid or granular bulk materials, the accessory revolves in a 360-degree circle in either direction with power being supplied by a hydraulic motor through a chain drive. Operation is controlled by a

valve located near the truck operator. With the carriage, a container mounted on the truck forks can be turned 180 degrees, to provide complete dumping, in approximately five seconds. Installation of the accessory does not affect normal operation of lift truck.

Saunders Patent Valve in High-Silicon Iron Alloys

The Duriron Co., Inc., Dayton 1, Ohio, has announced the availability of the Hills-McCanna Saunders Patent Valve with valve body in either Duriron or Durichlor (both high-silicon iron alloys). A tough, resilient, reinforced molded diaphragm, available in both rubber and synthetic rubber materials, separates the body from the operating mechanism.

Ball Bearing Flange Bearing

Dodge Manufacturing Corporation, Mishawaka, Indiana, has announced a ball bearing flange unit, designated as the *SC Ball Bearing Flange Bearing*, as an addi-

tion to a new line of ball bearings which are available in pillow blocks, hanger bearings, as well as in take-up units. This bearing, fully self-aligning, is suitable for mounting against vertical or horizontal frames and supports.

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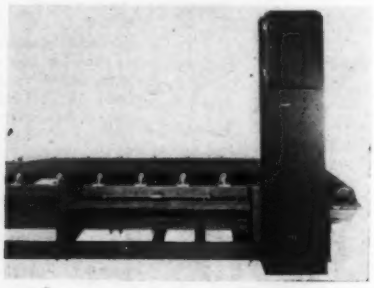
38 Maple Street, Orange, Mass., U.S.A.

Continuous Weighing Device for Wood Chips

Builders-Providence, Inc., Providence R. I., has announced the *Conveyflo Meter* as a continuous weighing device for use in connection with belt conveyors. The weighing section of the device is supported at one end by self-aligning ball bearing pillow blocks and at the other end "floats" on a diaphragm which transmits load changes hydraulically to the weighing mechanism. A cyclometer type totalizer which is automatically corrected for any



belt speed variations, reads directly in any unit desired.

A system of return belt weighing compensates for variations in belt weight and for adherence of material to the belt.

The continuous weighing of wood chips as well as the batching of wood chips to digesters are typical of the applications suggested by the manufacturer for the equipment.

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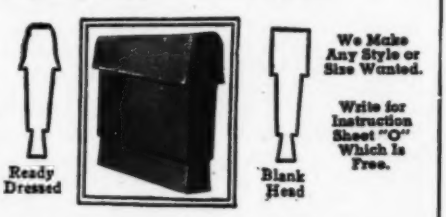

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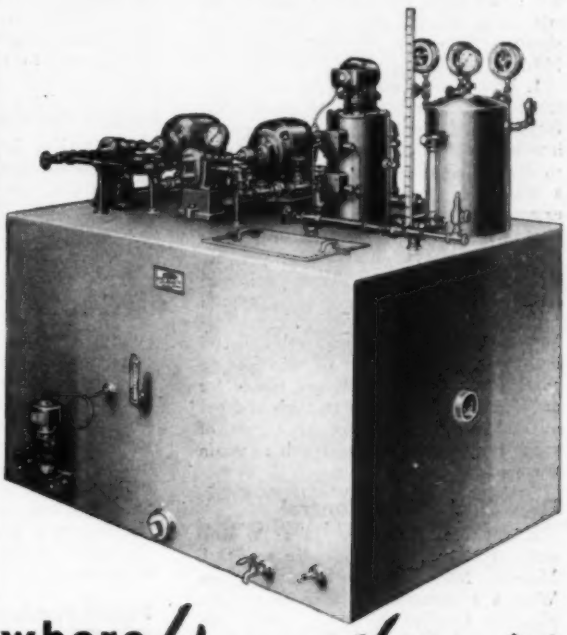

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IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Creping Machine

Patent No. 2,410,189. Louis A. Straubel and James W. Straubel, Green Bay, Wis.; said Louis A. Straubel, assignor to said James W. Straubel, as trustee. Application November 27, 1944, Serial No. 565,208. 8 Claims. (Cl. 154—30.)

1. In a creping machine for paper and other web material, a pair of smooth surfaced rolls forming a bite therebetween into which said web is drawn, a pair of rigidly mounted creping plates providing a restricted passage therebetween and extending into the delivery side of said bite, said plates having blunt leading edges closely adjacent to but not in pressure scraping relationship with said roll surfaces, said blunt edges in cooperation with the walls of said restricted passage having the effect of backing said web up upon itself in said bite ahead of said leading edges to be there creped, and means for drawing said creped web through and out of said restricted passage at a rate of speed such as to cause said web to retain much of its crepe.

Pulp Stock Flow Control

Patent No. 2,410,526. John A. Rosmait, Appleton, Wis., assignor to D. J. Murray Manufacturing Co., Wausau, Wis., a corporation of Wisconsin. Application October 2, 1944. Serial No. 556,796. 8 Claims. (Cl. 92—46.)

1. In combination with the surge and head boxes of a paper making machine, means for initially decelerating the flow of effluent stock discharged from the surge box and for converting its velocity energy into pressure, means for spreading the stock while under considerable pressure and as it flows away from said decelerating means, means for directly delivering the spread stock under pressure into the lower portion of the first pass of the head box throughout the entire width of the latter, and means for locally varying the cross-sectional area of said delivery means to insure uniform distribution of the stock.

Stock Regulator for Paper Machines

Patent No. 2,379,746. Ernest A. Poirier, Waterville, Maine. Application June 11, 1942. Serial No. 446,567. 5 Claims. (Cl. 137—68.)

1. In an apparatus of the character described, the combination with a head box having an outlet for a stream of stock, of a main gate adjustable to vary the area of said outlet, a vane for engaging the stream of stock flowing through said outlet, means supporting said vane on said main gate for swinging movement about a horizontal axis, said vane having parts to be engaged by the forward and rearward portions of said stream, whereby it will be moved toward and from said gate by changes in contour of the stream, means for adjusting said main gate, a supplemental gate mounted on but adjustable independently of said main gate to change the area of said outlet, and connections between said vane and said supplemental gates for causing changes in the position of the vane to adjust said supplemental gate.

Means for Coating Papers

Patent No. 2,406,056. William Barrett, International Falls, Minn., assignor to Minnesota and Ontario Paper Company, Minneapolis, Minn. Application November 24, 1943, Serial No. 511,753. 12 Claims. (C. 91—49.)

1. An apparatus for coating a continuous web of paper or analogous material, a web carrying roll; a resilient surfaced applicator, a fountain having an open side directed toward the applicator roll so that the said applicator roll and fountain form a coating material compartment, a doctor roll mounted in the fountain for cooperating with the applicator roll in controlling the amount of coating material applied to applicator roll, and means for supplying coating material to the fountain at a point in a plane between the middle of the doctor roll and the top of the fountain.

Paper Product and Method Of Making the Same

Patent No. 2,399,981. Kenneth W. Britt, Norwood, Pa., assignor to Scott Paper Company, Chester, Pa., a corporation of Pennsylvania. No Drawing. Application August 13, 1941, Serial No. 406,727. 11 Claims. (Cl. 92—40.)

7. The method of increasing the wet strength of paper while preserving substantially the dry tear resistance thereof which comprises impregnating paper with a solution of sodium silicate, impregnating said paper with a solution of an acidic material to convert the sodium silicate absorbed by the paper into silicic acid, said solution of sodium silicate furnishing between 0.1% and about 8% SiO_2 by weight based on the dry weight of the paper, said impregnating steps being conducted at a point in the production of said paper after the formation of the interfelted web and prior to the completion of the drying thereof, and heating said paper to dry it and to convert said silicic acid into silica distributed within and upon the surface of the fibres throughout the interfelted structure of the paper.

Creping of Webs With Thin Coatings of Creping Adhesive

Patent No. 2,399,256. William Wallace Rowe, Cincinnati, Ohio, assignor to Cincinnati Industries, Inc., Lockland, Ohio, a corporation of Ohio. Application January 18, 1943, Serial No. 472,737. 8 Claims. (Cl. 154—33.05.)

1. A process of creping webs with very thin coatings of creping adhesive which comprises forming a high viscosity solution, non-saturating to webs, of heat softenable adhesive solids, said solution being capable of being applied thinly in a coating operation, adhering a web to a creping surface by means of adhesive solids derived from a coating of said solution so thin as to contain about 2 pounds solids per 1000 square feet, controlling the coating intermediate the point of coating formation and the creping point by the elimination of some at least of the solvent and by temperature control to a consistency providing a positive adhesive bond between the creping surface and the web for creping purposes, the coating being capable of serving as a creping adhesive because the said adhesive solids are substantially unabsorbed into the web, and removing the web from said surface with a creping doctor.

CORRECTION

A transposition in copy by the printer resulted in the erroneous presentation of Patent No. 2,406,470 which was published on page 744 of the August issue.

The claim (1) published with that item was a part of Patent No. 2,406,057.

Corrected items on both patents are published herewith.

Coating Apparatus

Patent No. 2,406,470. William D. Maxim, Glens Falls, and Edward Hutchins, Corinth, N. Y., assignors to International Paper Company, a corporation of New York. Application April 4, 1944, Serial No. 529,434. 7 Claims. (Cl. 91—49.)

1. In coating apparatus of the type in which a pond of coating material is maintained within the nip between a pair of tangentially contacting rolls, the combination of means for supplying to said pond coating material in the form of a film substantially evenly distributed throughout the width of one of said rolls and means for varying the thickness of said film in response to changes in level of said pond to maintain said level substantially constant.

Coating Apparatus

Patent No. 2,406,057. William H. Barrett and Bernard K. Asdell, International Falls, Minn., assignors to Minnesota & Ontario Paper Company, Minneapolis, Minn. Application November 30, 1944. Serial No. 565,926. 12 Claims. (Cl. 91—49.)

1. In a coating unit including a backing means, an applicator roll for transferring coating material to a material to be coated supported by the backing means, a fountain having an open side directed toward the applicator roll so that the fountain and the applicator roll form a coating container, a metering roll mounted in the fountain at a selected distance from the applicator roll, and a doctor roll above the applicator roll at a selected distance therefrom.

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New Catalogues and Publications

The Louis Allis Company, Milwaukee 7, Wis.—Now available from this company is a four-page bulletin describing their new a-c adjustable speed drive motor, Ajusto-Spede, which is particularly adapted for such equipment as calenders, paper slitters and conveyors. Ask for Bulletin 611-C, and address The Louis Allis Company, 427 East Stewart Street, Milwaukee 7, Wis.

American Forest Products Industries, Inc., 1319 18th St., N. W., Washington 6, D. C.—Just published is the third annual edition of "The Effectiveness of Forest Protection in Organized Forest Areas," based on the latest statistics of the U. S. Forest Service. It also includes a comparison of the 1946 fire record with a five-year average, 1942-1947. Copies may be obtained without charge from the above address.

Blackhawk Mfg. Company, Milwaukee 1, Wis.—A new, postwar catalogue has just been issued by this company. The 36-page booket features 16 new assortments. Ask for Catalogue No. 247. Also available from this company is their Catalogue No. 46-T, listing six models of torque indicators.

Bowser, Inc., Fort Wayne, Ind.—Available on request from this company is Bulletin 3001, with complete specifications on four models of Bowser rotary hand pumps.

The Brown Instrument Company, Wayne and Robert Aves., Philadelphia 44, Pa.—A new catalogue, "Air Operated Controllers," has been published by this company, containing valuable information on instruments for the automatic control of industrial processes. The 40-page book includes many photographs, schematic drawings and diagrams illustrating the construction and principles of operation of instruments for temperature, pressure, flow, liquid level and humidity. Ask for Catalogue No. 8905. Also just published is a 48-page Catalogue, No. 2221, "Differential Controllers for Flow and Liquid Level," which presents many instruments and systems for the measurement, indication, recording and control of flow and liquid level. Photographs, schematic diagrams and dimensional drawings are used, as well as general mounting dimension diagrams and flow and liquid level charts.

Design Service Company, 31 Fulton St., Newark 1, N. J.—In a 24-page booklet just issued by this company is described its history, make-up, offices, aims and purposes. The scope of its engineering service includes processing and engineering of tools, mechanical and electrical design of intricate machinery, patent preparation, power plants, industrial installations, and chemical processing plants. The booklet has a list of the various branch offices.

Duriron Company, Inc., Dayton 1, Ohio—A complete 12-page manual, Bulletin 703, on the corrosion resistance, proper installation and use of acid proof sinks, just issued by this company, is of interest to all who handle corrosive wastes. There is also a 12-page data bulletin, Price List H. Another interesting publication available from this company is a "Guide to Selection of Durco Corrosion Resisting Alloys." It lists 155 corrosives in alphabetical order and shows which of five Durco alloys offers the most satisfactory resistance to each. Ask for Bulletin 100. There is also an eight-page bulletin, "General Catalogue J," describing 36 products made of Durco corrosion resisting alloys.

Electric Industrial Truck Association, 29-28 Forty-first Ave., Queens Plaza, Long Island City 1, N. Y.—Now being distributed by the member companies of the association is a booklet, "Looking Beyond the Price Tag." It discusses the basic requirements of mechanized material handling systems, and the importance of continuity once the flow of materials is mechanized. It stresses the importance of interpreting the value of such equipment in terms of dependability, handling speed, low operating cost, and safety for workers. Cartoon illustrations are used to point up the main factors in industrial truck selection.

Fischer & Porter Company, Hatboro, Pa.—A new bulletin announcing a complete line of corrosive service flow meters is now available. It also contains dimensional details and a section on laboratory type flow meters. Ask for Bulletin 1F-E.

B. F. Goodrich Chemical Company, Rose Building, Cleveland, O.—A new service bulletin has just been published by this company, No. 47-12, on the "Handling and Storage of Geon Latex." It describes the proper equipment to be used in storing the latices and checks to be made while they are in storage to maintain their stability.

Goulds Pumps, Inc., Seneca Falls, N. Y. Recently published by this company is Bulletin 710-1, on "Close-Cupld" Centrifugal Pumps. It includes photos, performance and dimension charts.

Hyster Company, Portland 8, Ore.—Now available from this company is their Condensed Lift Truck Catalogue No. 1074, which describes and illustrates the complete line of Hyster Lift Trucks, Straddle Trucks and Mobile Cranes, especially designed for use on pneumatic tires. A table of dimensions, load capacities and weights is also included.

Lewis-Shepard Products, Inc., Watertown 72, Mass.—Obtainable from this company is Circular 80-117, which shows illustrations of different types of material handling equipment, with short descriptions. Address Materials Handling Equipment Division, Lewis-Shepard Products, Inc., 327 Walnut St., Watertown 72, Mass.

Lyon-Raymond Corporation, Greene, N. Y.—This company has announced a new eight-page bulletin describing their portable hydraulic elevating tables. Full description of the various models are illustrated with photographs showing the tables in actual use. Copies of Bulletin 231 may be had by addressing the company at 3968 Madison St., Greene, N. Y.

New York State College of Forestry, Syracuse 10, N. Y.—A publication on log scaling has just been revised by the college. It is designed to aid those dealing with logs and lumber, and others who wish to know the number of board feet in logs and sawed lumber. The publication contains 13 illustrations showing how to make allowances for defects, and four tables of log measuring rules used in New York State. Write the Extension Department, New York State College of Forestry, Syracuse 10, N. Y.

Reliance Electric and Engineering Company, 1066 Ivanhoe Road, Cleveland, O.—Offered by this company is Bulletin 311-A, covering their all-electric adjustable speed drives in the higher horsepower ratings. It details the equipment needed for operation from a-c, 2-phase, or 3-phase, 60-cycle, 220, 440 or 550-volt circuits.

Poole Foundry and Machine Company, Baltimore 11, Md.—A handsome loose-leaf booklet, with leather binding, entitled "Flexible Couplings, Their Value and Many Advantages," has been issued by this company. Numerous photographs, diagrams and charts add to the value of the book. Ask for Catalogue 44.

Towmotor Corporation, 1226 E. 152nd St., Cleveland, O.—A new 28-page "Lift Truck Guide" published by this company, simplifies the selection of the correct fork lift truck, industrial tractor or fork lift truck accessory, for any materials handling job. The booklet, in handy pocket size, contains illustrations and drawings of the complete line of Towmotor materials handling equipment, with a list of specifications for each model. Copies may be obtained from Towmotor Corporation or any sales representative.

BOOKS

Low-Pressure Laminating of Plastics—In brief, as covered by a statement in the preface, this work of more than 160 pages outlines the steps necessary to fabricate a laminate, points out sources of materials required, and enumerates some of the pitfalls to be avoided. The text treats of The General Field of Plastics; The Design and Use of Molds; Resins, Catalysts and Curing; Reinforcements for Plastics and Sandwich Structures; Properties of Plastics; Illustrations of Laminating Tank Cover, Boat Deck, and Milk Bottle Case; Joining and Machining of Plastics; and Product Analysis: Engineering and Cost Principles.

The book includes both a patent index and a subject index as well as an outline for laboratory experiments.

Authored by J. S. Hicks, Technical Co-ordinator, Plastics Division, Owens-Corning Fiberglas Corporation with the assistance of R. J. Francis, Chemical Engineer, Products Laboratories of the same manufacturing organization, and published by Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y., this book is priced at $4.50 a copy.

Organic Reagents for Organic Analysis—Written by the staff of Hopkins and Williams Research Laboratory, this book embraces the use of organic reagents in preparing derivatives of organic substances for purposes of identification by melting points. The book opens with a section covering the following chemical groups and their derivatives: carboxylic acids, alcohols, aldehydes and ketones, alkaloids, amides, amines (primary, secondary and tertiary), barbituric acids, ethers, halides, aromatic hydrocarbons, mercaptans, nitriles, phenols, sulphonamides, and sulphonic acids. The second section discusses the organic reagents—their uses for identification of the various groups of organic compounds and in the preparation of derivatives being discussed in some detail. The third and concluding section tabulates the melting points of the organic derivatives treated in the volume. Published by The Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, New York, the book is priced at $3.75 a copy.

The Technology of Adhesives—Written by John Delmonte, technical director, Plastics Industries Technical Institute (Los Angeles, California), this book treats of the following subjects: Introduction and Classification of Adhesives; Phenolic Resin Adhesives, Urea and Melamine Resin Adhesives; Miscellaneous Thermosetting Resin Adhesives; Polyvinyl Resin Adhesives; Polystyrene and Acrylic Resin Adhesives, Adhesives from Miscellaneous Thermoplastic Synthetic Resins; Rubber Adhesives; Adhesives from Cellulose Derivatives; Adhesives from Protein Products; Vegetable Glues and Natural Resin Adhesives; Animal Glues; Sodium Silicate Adhesives; Theories of Adhesive Action; Adhesives for Wood; Cementing of Organic Plastics; Adhesives for Metal and Rubber; Adhesives for Tapes, Papers, Cloths, and Foils; Adhesives for Inorganic Materials; and Tests and Specifications for Adhesives. The text, with extensive bibliography following each chapter, covers more than 500 pages. The book is priced at $8.00 a copy; it is published by Reinhold Publishing Corporation, 330 W. 42nd St., New York, N. Y.

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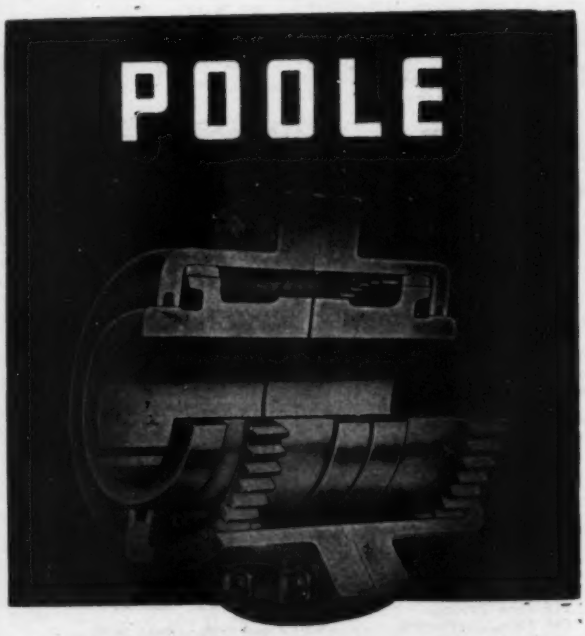

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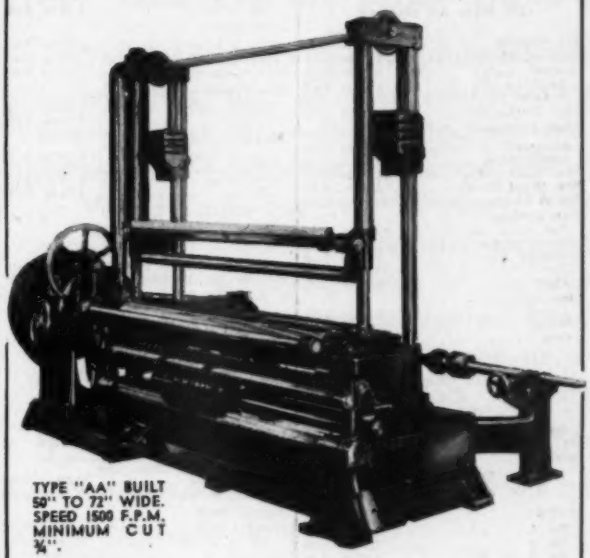

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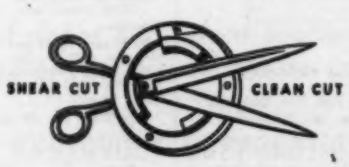

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

(All Prices Are Nominal)

	per cwt.
Blue Overalls	8.50 to 9.00
Corduroy, Men's	4.50 to 5.00
Corduroy, Ladies'	4.50 to 5.00
Washables, No. 1	5.25 to 5.75
Percales	7.25 to 7.50
Light Prints, No. 1	6.75 to 7.25
Khaki Cuttings—	
Bleachable	6.00 to 6.50
Unbleachable	5.50 to 6.00
New White Canvas	11.00 to 12.00
New Mixed Blacks	4.50 to 5.00
Canton Flannels, Bleached	10.50 to 11.00
Shirt Cuttings—	
New White No. 1	12.50 to 13.00
White Shrunk	9.50 to 10.00
Silesias No 1	8.50 to 9.00
New Unbleached	13.00 to 13.50
Fancy	6.50 to 7.00
Linen Cuttings—	
American	8.50 to 9.00
White	14.50 to 15.50
Grey	13.50 to 14.50

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OLD RAGS

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(All Prices Are Nominal)

	per cwt.
Roofing—	
No. 1	1.80 to 1.85
No. 2	1.70 to 1.75
No. 3 and No. 4	1.60 to 1.65
Twos and Blues—	
Repacked	3.25 to 3.50
Thirds and Blues—	
Repacked	3.00 to 3.25
Miscellaneous	2.25 to 2.50
Whites, No. 1—	
Repacked	4.50 to 4.75
Miscellaneous	3.75 to 4.00
White, No. 2—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

(All Prices Are Nominal)

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	5.75 to 6.00
Wool Tares—	
Light	5.75 to 6.00
Heavy	6.00 to 6.25
No. 1 Scrap Bagging	5.00 to 5.25
Manila Rope—	
No. 1 large	6.50 to 6.75
No. 1 small	5.50 to 5.75
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	5.50 to 5.75
No. 2 sisal	5.00 to 5.25
Soft jute	4.50 to 4.75
Mixed	2.50 to 2.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

(All Prices Are Nominal)

	per ton
Shavings—	
Hard White Env. Cuts	150.00—
Hard White, No. 1	130.00—
Soft White, No. 1	100.00—
Soft White, One-cut	120.00—
Soft White, Misc.	90.00—
Fly Leaf, No. 1	55.00—
Fly Leaf, Woody, No. 1	45.00—
No. 2 Mixed Col. Woody	35.00—
Flat Stock—	
No. 1 Heavy Books and Magazines	32.50 to 35.00
Mixed Books	22.50 to 25.00
Ledger Stock—	
No. 1 White	80.00 to 85.00
No. 1 Mixed (Colored)	65.00 to 70.00
Manilas—	
New Env. Cuttings	130.00 to 140.00
New Env. Cuts, One-Cut	—
Extra Manilas	—
Manila Tab Cards, Free of Ground Wood	80.00 to 85.00
Colored Manila Tab Cards	65.00 to 70.00
Kraft—	
New Envelope Cuttings	115.00 to 120.00
Tripled Sorted No. 1 100%	70.00 to 75.00
New 100% Cor. Cuts	65.00 to 70.00
No. 1 Old Assorted	50.00 to 55.00
News—	
White Blank	70.00 to 75.00
Overissue	29.00 to 30.00
No. 1 Baled	19.00 to 21.00
Old Corrugated Containers	32.00 to 34.00
New Corrugated Cuts	38.00 to 40.00
Mill Wrappers	32.00 to 34.00
Box Board Chips	14.00 to 15.00
No. 1 Mixed Paper	16.00 to 18.00

CHEMICALS

f.o.b. shipping point

(All Prices Are Nominal)

Alum (Papermakers)—	
Lump, cwt.	4.25—
Ground, cwt.	4.00—
Powdered, cwt.	4.40—
Blanc Fixe—	
Pulp, bulk, ton	$55.00—
Dry, barrels, pound	07.50—
Bleaching Powder—	
Drums, cwt.	2.75 to 2.25
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	31.00 to 32.00
Argentine, lb.	27.00 to 28.00
China Clay—	
Domestic Filler Bulk (mine) ton	9.00 to 15.00
Domestic Coating Bulk (mine) ton	14.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 25.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	1.60 to 1.65
Glue, (C.P.) drums, lb.	.29¼—
Litharge, powd., bbl., lb.	.16½ to 17
Rosin (Gum)—	
New York, per 100 lbs.	
E	8.00—
F	8.00—
G	8.40—
WW	8.83—
Rosin (Wood), carlots	6.25—
Salt Cake—	
Dom. bulk (wks) ton	22.00 to 24.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	25.00 to ——
Soda Ash—	
Bulk (works), cwt.	1.00 to ——
Paper Bags, cwt.	1.25 to 1.35
Barrels, cwt.	1.35 to 1.60
Soda (Caustic)—	
Solid, drums, cwt.	2.50—
Ground and flake, drums, cwt.	2.90 to 3.00
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	6.37—
Pearl, barrels, cwt.	6.37—
Paper (Sp.) bags, cwt.	6.37—
Powdered, barrels, cwt.	6.48—
Sulphur (Crude)	
(Mine) bulk, long ton	16.00 to —
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 28.00
Canadian	33.00 to 45.00
Titanium Dioxide—	
Barium Pig., bbls., lb.	.06½ to .07
Calcium Pig., bbls., lb.	.06½ to .06¾
Zinc Sulphide, bbls., lb.	10.50—

WOOD PULP

Prices, dollars per short, air dry, ton, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

(All Prices Are Nominal)

Bleached sulphite, Swedish	175.00 to 182.50
Bleached sulphite, Finnish	175.00—
Bleached sulphite, dom.	120.00 to 125.00
Easy bleaching sulphite	—
Unbleached sulphite, Swed.	145.00 to 155.00
Unbleached sulphite, Fin.	145.00—
Unbleached sulphite, dom.	115.00—
Unbleached kraft, Swedish	140.00 to 148.00
Unbleached kraft, Finnish	140.00—
Unbleached kraft, northern	112.50 to 125.00
Unbleached kraft, southern	90.00 to 130.00
Bleached sulphate, Swedish	175.00 to —
Bleached soda, domestic	120.00 to 125.00
Sulphite screenings, dom.	55.00 to 60.00
Sulphate screenings, dom.	55.00 to 60.00
Groundwood, domestic and Canadian	75.00 to 80.00

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Boards—	per ton
Binders	94.00—
Chip	90.00—
Chip, tube and can	95.00—
Chip, full blending	97.50—
Chip, sgl. mla. lined	95.00—
Coated, white patent .016	120.00—
.020 and heavier	110.00—
Kraft liner	79.00—
Filled News	90.00—
Container	90.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	13.30—
B Grade E. F.	—
C Grade E. F.	—
D Grade E. F.	—
No. 2 Uncoated Offset 4 sides, White	—
Machine Coated White (Trimmed 4 sides)	
No. 1 Glossy	18.60—
No. 2 Glossy	17.35—
No. 3 Glossy	17.00—
No. 4 Glossy	—
No. 2 Offset	14.75—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt.
(In Ton Lots)	
Extra 100% Rag	48.00—
100% Rag	41.00—
75% Rag	31.50—
50% Rag	27.50—
25% Rag	24.50—

Rag Content Ledger—	per cwt.
(In Ton Lots)	
Extra 100% Rag	48.00—
100% Rag	41.00—
75% Rag	32.00—
50% Rag	27.00—
25% Rag	24.00—

Sulphite Bond—	per cwt.
Air dry, watermarked	—
No. 1 watermarked	16.75—
No. 2 watermarked	16.00—
No. 4 watermarked	14.50—

Sulphite Ledger—	per cwt. Zone 1
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No. 2 watermarked	16.75—
No. 4 watermarked	15.50—

Glassine (f.o.b. mill)—	per cwt.
Embossed (25 lbs. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof—	
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—

News—	per ton
Rolls, Standard (Contract)	90.00—
Rolls (Spot)	(Nominal)
Sheets	100.00—

Tissues (Carlots)—	per ream
White No. 1	1.70—
White No. 2	1.60—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.85—
Manilla	1.50—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.80—
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.80—
Toilet, Bleached (M shts.) per cs.	7.50—
Toilet, Unbleached (M. shts.) per cs.	6.00—

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Bleached	4.75—
Unbleached	4.00—

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Super-Standard	7.00 to 7.50
No. 1 Wrapping	6.50 to 7.00
Standard Wrapping	6.25 to 6.75
Standard Bag	6.25 to 6.75
Variety Bag	—

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Drug wrapp., 35 lb.	—
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—

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No. 2	—
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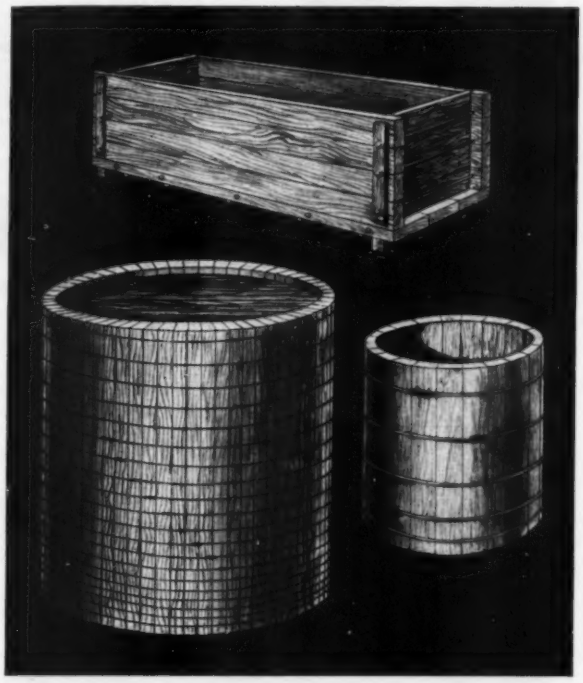

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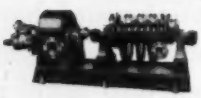

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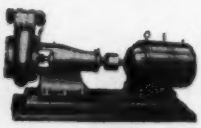

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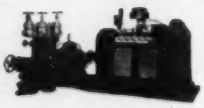

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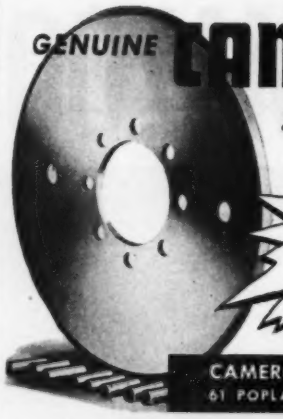

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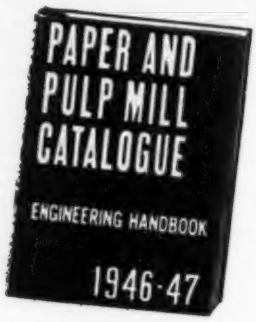

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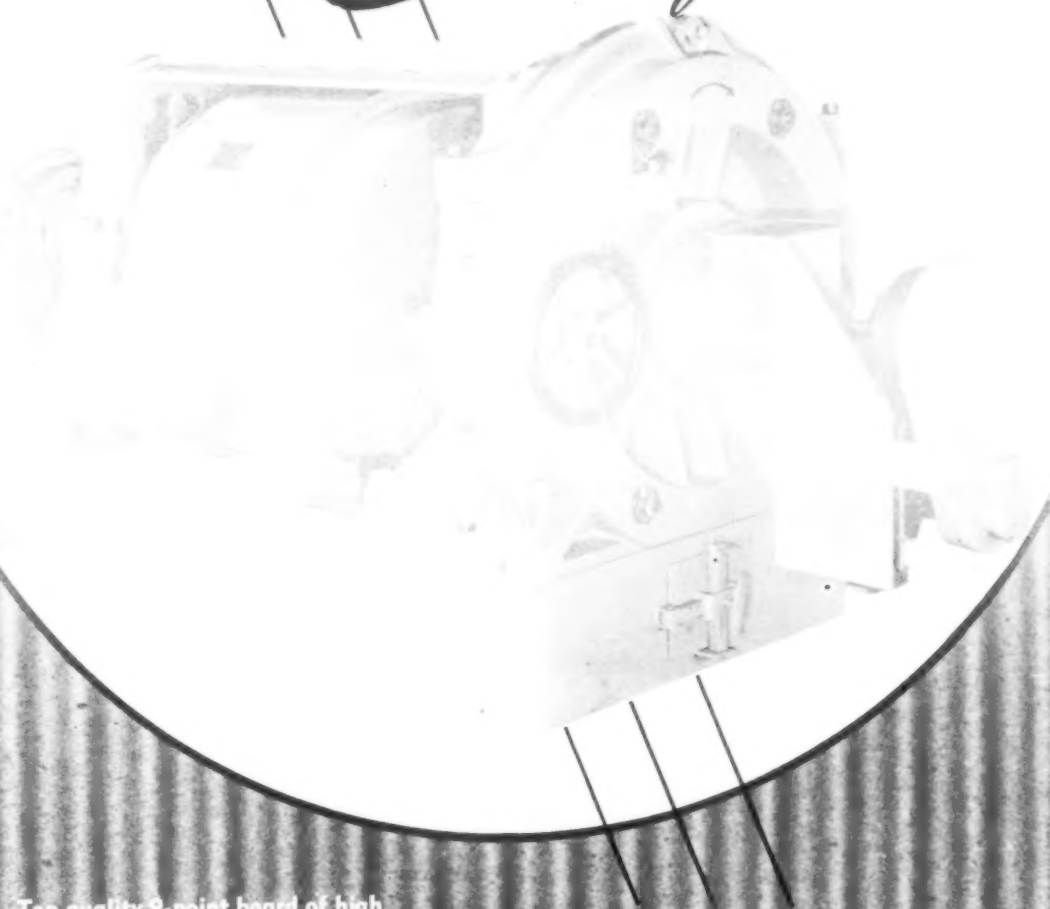

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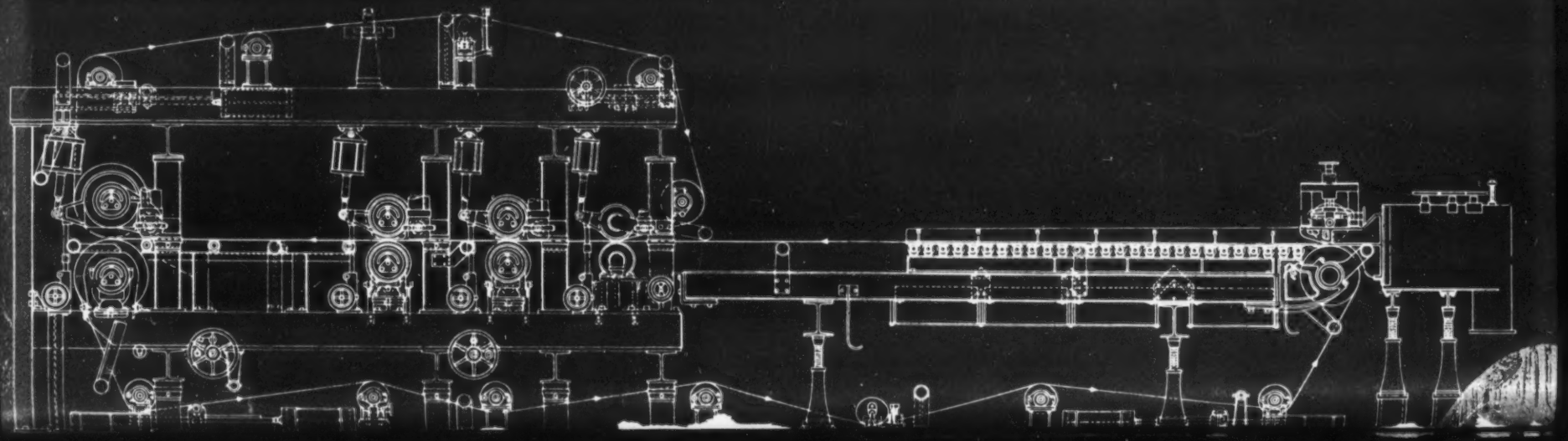
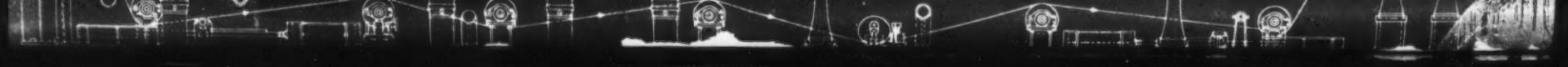
Manufacturing Engineers

FOUR "DOUBLE" SUCTION PRESSES IN NEW* INSULATING BOARD MACHINE

Cantilever Type Machine . . . Designed . . . Built . . . Installed . . . and Operating . . . all since V-J Day. This is the "First" Insulating Wall Board Machine ever built in which "all the pressing" is done by suction rolls operating in pairs. Note that Downingtown Suction Rolls are used for both TOP and BOTTOM Press and that no plain press rolls are used. . . . Ask us about other paper and board machines we have recently built, and are building. Downingtown Mfg. Co., Downingtown, Pa.

DOWNINGTOWN
Designers & Builders
Paper Making Machinery